The ghost of the deep sea --- a nuclear submarine cruising in the four oceans（Fangruida）

Nuclear submarine attacks, strategic bombers, land-based nuclear missiles and space warfare

--------Modern war and future war (new cold war and hot war)

The ghost of the deep sea --- a nuclear submarine cruising in the four oceans

The ocean is the heart of the earth, and the ocean is the cradle of life on the earth.

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In the modern world, science and technology are developing rapidly, the construction of countries in the world is changing with each passing day, and the global output value has reached 80 trillion US dollars. World peace is the first guarantee. The primary task of the United Nations is to oppose war and maintain world security and world peace. With the economic development of various countries, commerce and trade, the dissemination of cultural information, the improvement of education, etc., competition for resources, competition for advantages, competition for land, competition for space, etc., countries in the world are more closely connected. At the same time, competition among countries in the world has become more intense, various competitions have become more frequent, and various conflicts have become increasingly prominent. From time to time, there will be the shadow of war in the world, and there will even be various confrontations. The preparation and expenses of countries around the world are also increasing substantially. Wars and even nuclear wars (biochemical weapons, etc., space wars, etc.) may occur. Of course, world peace has always been the mainstream, and the end of the war will be non-mainstream. However, wars are devastating and can even destroy the earth and mankind. For example, nuclear wars are not alarmist. The people of the world must cherish peace and oppose all kinds of unjust and non-human intelligence and rational wars. Therefore, it is the choice of all mankind to oppose various unjust and non-human intellectual and rational wars and to safeguard and defend world peace. However, this does not mean that the world is peaceful. If you can sit back and relax, you will lose your vigilance. For example, the tragedies of World War I and World War II will repeat itself. It is inevitable that there are madmen and madmen in the world, otherwise, major disasters will occur. Human beings kill and attack each other like primitive animals, which are even more terrifying in the 21st and 22nd century, such as nuclear bomb attacks, space warfare, biological and chemical weapons, virus weapons and so on. Atomic bombs, nuclear submarines, strategic bombing vehicles, land-based nuclear missiles, anti-satellite weapons, etc., must have sufficient understanding and awareness of these, which will greatly help people’s knowledge and information, and cherish world peace and "ban nuclear". The gradual destruction of all nuclear, biological and chemical weapons has become the first choice. The peaceful use of nuclear energy for the benefit of mankind, rather than resorting to war and nuclear war. Of course, we can't talk about the discoloration of the tiger, the soul frightened by the nuclear war. Nuclear balance, nuclear containment, the peace-loving efforts and struggles of all mankind, the supreme freedom and rational wisdom of mankind, etc., are essential for preventing nuclear war. Maintaining the lives and well-being of human beings on the earth is above all else, above all else. We always believe that the era of complete prohibition and destruction of all nuclear, biological and chemical weapons will definitely come.

We must not be pessimistic and disappointed, let alone shrink back from ourselves, and we must act bravely. The future of the world belongs to all mankind. World peace and human happiness is the only choice and goal of mankind. Human beings cannot relax their vigilance to prevent major wars from happening and defend world peace. At the same time, they must also increase their awareness to maintain peace and freedom with strength instead of talking about soldiers. As a result, the war broke out and fell into chaos, causing human society to suffer misery and suffering. . Contradictions complement each other, and if there is a spear, there will be a shield, so that we can prevent problems before they happen. The peaceful development of the world is the common ideal of all mankind. No one can stop and destroy it. Otherwise, it will be punished ruthlessly by history. World peace, human development, economic development, social development, and various civilizations and traditions of all nations and ethnic groups, must learn from each other and learn from each other's strengths. The stones of the mountain can be used for jade. Of course, we must resist wrong, irrational and non-modern civilization. And criticize, you cannot blindly worship and follow. The development of human history is very long, and all kinds of human races and competitions are inevitable. Without competition and various contradictions, the world would not exist. There is harmony and there must be struggle. The world will never be the same, iron plate, positive and negative, sky and earth, heat and cold, from the natural world to the animal world, from the primitive society to the modern planetary society. The naive and fanatical ideal society of fantasy of pure romance is not a great and difficult cause that can be created or accomplished overnight, otherwise, it will fall into confusion or crazy cliff and cannot extricate itself. Human beings have to pay more and more for this. Wars or even nuclear wars, no matter who wins or loses, no matter the fish die and the nets are broken, they all end up and completely destroy the earth. These have no natural or any physical meaning for the natural universe. These very simple truths are treated equally to any politician and military strategist. Competition and war are not synonymous, and war is also competition, but the connotation and nature are not the same. Competition is free, peaceful and rational, while war is the opposite (except for just war, which is another matter). This is the way of mankind, the way of the world. Regardless of the East and West, no matter what kind of system, what kind of system or belief, free, peaceful and rational competition is the right choice. The theory of war, the theory of peace, the theory of controversy, the theory of rationality, and the theory of liberty have a wide scope, which requires in-depth and detailed research and analysis to arrive at the ideal answer. It is not advisable to know a little about it, or to swallow it, or not to understand it. The traditional thinking of thousands of people is the most terrifying, stupid, and stubborn force. Failure to recognize this will make a big mistake. Humans need to move forward very complex and difficult to be effective. Scientific revolution, natural revolution, planetary revolution, social revolution, genetic revolution. This applies to both the East and the West. The development of Islam, Catholicism, Buddhism, Eastern Orthodox, etc. is also complicated and long, and there are also many contradictions. Feudal system The central government entrusted the land as a beloved feudal lord, and the feudal lord entrusted it to his subordinates as a feudal lord. The feudal lord was divided into layers and formed a master-slave relationship, forming a hierarchy like a ladder. This is the basic feature of feudal land ownership in Western Europe. In 1985, in order to stop the competition for military expansion under the Cold War, Gorbachev and former US President Reagan jointly issued a statement that "there is no victor in a nuclear war, and it must never be allowed to happen." Gorbachev: If human beings fall into the same predicament again and again, there will be no good results. There are many signs that both the West and Russia are gradually

understanding how important a smooth and dynamic channel of dialogue is. The discourse system for expounding history is slowly changing. This is a positive first step. Of course, there is still a long way to go before the two sides fully restore mutual trust. I personally think that the breakthrough may be the nuclear abandonment plan. I recently called on all nuclear nations around the world to jointly issue a statement against nuclear war. Correspondingly, Russia and the United States, the nuclear-weapon powers, sat down and talked about how to improve diplomatic relations.

Ocean Resources The ocean is the lifeblood of mankind and the lifeblood of the earth

Puntos is a male god who symbolizes "the bottom of the sea" in Greek mythology. The brother of the mountain god Ourea. The lover and son of the earth goddess Gaia.

Pontos

With diversified civilizations, it is difficult to avoid all kinds of conflicts between civilizations, such as Eastern and Western civilizations, Eastern and Western civilizations, conflicts between Islamic civilization and Western civilization. There are big differences in races, genetic mutations, patterns, social structures, culture, history, religious beliefs, languages, politics, economics, etc., conflicts and confrontations are indeed inevitable, and wars also occur from time to time. This is not surprising. As all rivers return to the sea, human beings will eventually move towards assimilation, which is the general trend and the unstoppable. Freedom, rationality, wealth, peace, universal love, universal happiness, irreversible and irreversible. If this is not the case, the long-term evolution of human society will degenerate into primitive animals. After tens of thousands of years, mankind will gradually slowly and very difficultly move towards the new world.

Due to the movement of the earth, bumps are formed in the flat, and the unfathomable depression is the "sea". Therefore, Puntos essentially refers to the "big pit" that contains the sea, and is a sea god in the geological sense.

Poseidon (Greek: Ποσειδῶν, English: Poseidon), is the god of the sea in ancient Greek mythology and one of the twelve gods of Olympus. He is also the god in charge of horses. Legend has it that he gave the first horse to mankind. His mount was a golden chariot driven by a white horse. He was the brother of Zeus and the younger brother of Hades.

When Poseidon is angry, sea monsters will appear in the sea. When he wields a trident, he can not only easily set off huge waves, but also cause storms and tsunamis, sink the continents, break the world, and crush everything, even A big earthquake was triggered. When his chariot was running on the sea, the waves would become calmer, and dolphins would follow around, where the power of the sea god was. Therefore, the Greek seamen and fishermen near the Aegean Sea adore him extremely.

The Romans corresponded to the Greek gods as Roman gods in the late empire. The Roman god corresponding to Poseidon is Neptune, the god of water, from whom the Latin name of Neptune originated.

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Christopher Columbus (Autumn 1450/1451-May 20, 1506), explorer, colonizer, and navigator, was born in the medieval Republic of Genoa (now northwestern Italy). Although Columbus was not the first European explorer to reach the Americas, Columbus' voyage brought the first sustained contact between Europe and the Americas, and opened up the European exploration and colonization of overseas territories in Europe that would last for centuries. era.
Zheng He went to the West. On July 11, 1405 (Yiyou, June 15th, Yongle 3rd year) At the age of 34, Zheng He set sail from Nanjing Longjiang Port and went to sea via Taicang. Wang Jinghong led 27,800 people to go to the West for the first time. On the second day of the month (October 2, 1407) he returned to China.

October 13, 1407 (September 13, Yongle 5th year, Dinghai) 36 years old After returning to China, he immediately led a fleet with Wang Jinghong, Hou Xian, etc. to the Western Ocean for the second time, reaching Brunei, Thailand, Cambodia, India and other places.
Ferdinand Magellan (full name Ferdinand Magellan, spring 1480-April 27, 1521), explorer, navigator, colonizer, Portuguese, worked for the Spanish government to explore. From 1519 to 1521, he led a fleet to complete the circumnavigation of the earth. Magellan died in tribal conflict in the Philippines on his way around the world. The sailor on the ship continued to sail westward after his death, returned to Europe, and completed the first human circumnavigation. James Cook
James Cook
James Cook is an explorer, navigator and cartographer in the UK. 6 da gammaedit
In the year of the Portuguese (approximately 1460～1524.12.24), a new route from Europe to India from the sea。

The reserves of fish resources are about 70 million tons, and 85% comes from the ocean. 95% of the diamonds, 90% of the rutile, 90% of the diamonds, 80% of the monazite, and 75% of the cassiterite in the world come from coastal placers, and more uranium ore. The total amount of gold in seawater is equivalent to more than 170 times the land reserves. Silver is equivalent to more than 7,000 times the land reserves. Sea water contains more than 80 of the more than 100 elements known on earth. Offshore oil accounts for 40% of the world's total reserves.

At present, the development and utilization rate of countries in the world is very small. For example, the food provided by the ocean to humans is equivalent to 1,000 times that of land agricultural products, but the current utilization of marine organisms is less than 1%. The ocean tidal energy reserves are about

2.7 billion kilowatts, wave energy is about 1-10 billion kilowatts, ocean current energy is about 5 billion kilowatts, and the salinity difference can be about 2.6 billion kilowatts. This energy is about 1,000 times more than all the energy of all the animals and plants growing on the earth today, and only a small part of it is currently used.

The limitation and vulnerability of marine resources

On the one hand, some marine resources are non-renewable resources, such as oil and gas and seabed minerals; on the other hand, the offshore ecology is fragile, and red tides occur more frequently in the sea area. It is very important to protect the marine ecosystem. For example, earthquakes, tsunamis, volcanic eruptions, climate, etc.

It is also impossible for countries to completely cut off or close their countries. The development of economy and trade, the development of science and technology, the development of society, the development of culture and education, retrogression is tantamount to self-destruction and self-destruction.

The feudal lord has the responsibility to protect the vassal, and the vassal must be loyal to the lord. The internal ties of the feudal lord class are strengthened. Secondly, when the vassals obtained the benefice, they also obtained the jurisdiction of the peasants in the territory, which strengthened the control of the laborers. After the reform of the fief, the cavalry gradually replaced the infantry, laying the foundation of the Western European chivalry system, and also creating conditions for the future prosperity of the Carolingian Dynasty. Britain has established a constitutional monarchy in which the bourgeoisie and the new aristocracy are jointly governed; the American Revolution of Independence is both a bourgeois revolution and a national liberation war; the French Revolution is the largest, most thorough and typical bourgeois revolution in the era of the bourgeois revolution . Russian serfdom, from the second half of the 15th century to the first half of the 19th century, Russia established an economic and legal system on the basis of the landlord’s manor economy with the labor system as the main form of exploitation.Human nature and reason, freedom and peace are beyond doubt. The entire history of mankind is nothing more than the history of constantly moving from animal wildness to human reason, from the kingdom of necessity to the kingdom of freedom. No matter how history develops or evolves, no matter how the world changes, this trajectory remains the same. It is also a fallacy to think that human history and the world will be bleak and colorless, or that humans will regress to the old social model. The change and development of society are not shifted by anyone's subjective will. Of course, throughout the long process of human history, the main line and the side line have always been intertwined, and it is hard to distinguish between them. The economy is the main thing, but it does not control everything. Without basic freedoms and human rights and other political structures and elements of a modern democratic society, it is difficult for the economy to develop sustainably and prosperously. Liberal democracy and centralization of rights protection are not synonymous terms, but within a certain period and within a certain range, each has its own advantages and disadvantages. However, from a long-term historical perspective, human freedom and liberation are the foundation of the existence and development of all societies, as well as the bottom line of human development and survival. Free rationality will eventually prevail.

(1) Atomic bomb (nuclear bomb)

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Atomic bomb, also known as fission bomb, is a nuclear weapon made using nuclear principles. It was first developed by „E’ %BD" in the United States and has extremely strong destructive power. When it explodes, it will emit strong E%84" nuclear radiation, which will harm biological and non-biological tissues. The energy released by the first fission test explosion was the equivalent of about 20,000 tons of explosives. The first thermonuclear test explosion releases the same energy equivalent of 10,000,000 tons of explosive.

A fission process of the 235U nucleus

(Quoted from WiKi Encyclopedia)

Atomic bombs explode using the principle that uranium and plutonium, which are more prone to fission, can emit huge energy at the moment of nuclear fission.

After being bombarded by neutrons, heavy nuclei such as uranium-235 and plutonium-239 usually split into two medium-mass nuclei, and at the same time emit 2 to 3 neutrons and 200 meV of energy. Some of the neutrons released in fission are lost in the fission system, and some continue to undergo heavy nuclear fission reactions. As long as the number of neutrons fissioned in each nuclear fission is more than one on average (that is, the neutron increment coefficient is greater than 1), then nuclear fission can continue. After one reaction, the total number of fission neutrons is It grows exponentially, and the energy produced also increases dramatically. If not controlled, eventually, this fission system will become a violent chain fission reaction. This is the process of nuclear fission. As we all know, such knowledge is also available in middle school and elementary school courses. For example, atoms and atomic energy are quite popular.

In this type of heavy nuclear fission reaction, the system can release a large amount of energy in a very short time. When the "next generation" neutron number is positioned at two, in less than one microsecond, there will be {\displaystyle 2.5\times 10}24 nuclei fission reactions in a kilogram of uranium or plutonium, and just in In less than a microsecond, the energy produced by this reaction is equivalent to 20,000 tons of TNT equivalent. This is also the source of the extremely destructive power of the atomic bomb.

In the actual use and explosion of the atomic bomb, it is necessary to increase the power of the explosion. In order to use the "fast neutron fission system", it is necessary to use a high concentration of fission material as the charge, and the charge must far exceed G•, HI‡ The critical mass of %8F" makes the neutron increment coefficient much greater than one „F − ™-3".

The energy produced when an atom explodes is based on the formula $E=mc^2$ .

Atomic bomb structure

The atomic bomb is composed of a detonation control system, high-energy explosives, a reflective layer, nuclear components containing nuclear charge, a neutron source, and a shell.

High-energy explosives are the energy source for pushing and compressing the reflective layer and nuclear charge.

The reflective layer is generally composed of beryllium or uranium-238, and its role is to reflect the neutrons of the reaction system during the chain reaction, so that it will return to the reaction process and continue to participate in the chain reaction.
Uranium-238 can not only reflect neutrons, because of its high density, it can slow down the expansion of the nuclear charge during the release of energy, so that the chain reaction can be maintained for a long time without decay.
Nuclear fuel is a material that can produce practical nuclear energy through nuclear fission or nuclear fusion in a nuclear reactor. Fission of heavy nuclei and fusion of light nuclei are the two main ways to obtain practical uranium rod nuclear energy.

Uranium 235, uranium 238 and plutonium 239 are nuclear fuels capable of nuclear fission, also known as fission nuclear fuels. Among them, uranium 235 exists in nature, while uranium 233 and plutonium 239 are artificial nuclides formed after thorium 232 and uranium 238 absorb neutrons.

Uranium is an element with atomic number 92. Its %A0GE...\\1235751" element symbol is U, which is the heaviest element that can be found in nature. There are three isotopes in nature, all with E‥‥‥F€ \\1205455" is radioactive and has a very long half-life (hundreds of thousands to 4.5 billion years). In addition, there are 12 artificial isotopes (226U~240U). Uranium was developed by Martin Heinrich Klaprot in 1789 (Martin Heinrich Klaproth) discovered

At present, the charges that are available in large quantities and can be used in atomic bombs are uranium-233, uranium-235 and plutonium-239, uranium 235 contains plutonium 239, and thorium 232 contains uranium 233.
The nuclear charge is the main body of the atomic bomb detonation, and only if its volume or mass exceeds a certain critical value, the atomic bomb may explode.
The destructive power and destruction methods of the atomic bomb mainly include optical radiation, shock waves, early nuclear radiation, electromagnetic pulses, and radioactive contamination. Modern nuclear scientific research shows that after the atomic bomb exploded, the migration of air, soil, water, sea, organisms, plants, etc. Sexual concealed viral pollution damage is even more terrible, and its consequences are far from imagined. In other words, the outbreak of nuclear war is difficult to maintain the survival of human beings on the earth. The destruction of the earth and the demise of mankind are not alarmist, but reality and reality.

After the atomic bomb is detonated, the nuclear explosion process will release intense radiation. When an atomic bomb with an equivalent of about 20,000 tons explodes in the air, people at a distance of 7,000 to 8,000 meters from the core of the explosion will be exposed to light radiation that is 13-20 times stronger than sunlight. In the range of 2800-3500 meters, light radiation will quickly blind people, and the skin will be burned and ulcerated in large areas due to light radiation, and some objects will burn.
After the atomic bomb explodes, the nuclear explosion will produce a huge air current overpressure. After a 30,000-ton equivalent atomic bomb explodes, the shock wave will hit everything at a speed of 200 meters per second at a distance of 800-900 meters from the core of the explosion.

Within tens of seconds of the initial detonation of the atomic bomb, the nuclear explosion will release a stream of neutrons and gamma rays. When a 20,000-ton atomic bomb explodes, personnel and units within 1100-1500 meters from it will be severely damaged by rays and neutron streams.

The nuclear explosion caused by the atomic bomb will produce electromagnetic pulses, and the electric field strength of electromagnetic pulses can reach 10,000 to 100,000 volts or higher, which can completely destroy all electronic equipment around the detonation point.

Since the late 1950s, uranium has been increasingly used as nuclear fuel for nuclear power generation. The energy released by the complete fission of 1kg235U nuclear is equivalent to the energy released by burning 2,700t of high-quality coal.

In addition, uranium nuclear reactors can also be used as radiation sources, for agricultural radiation breeding, food industry food preservation and sterilization, and can also be used to produce artificial elements. In medicine, it is used for radiotherapy, radioimmunoassay kits, lung fluoroscopy, and imaging diagnosis. In industry and geology, it is used for industrial flaw detection, automatic control, geological prospecting and cultural relics and archaeology.

Scientific research and industrial practice have proved that uranium is the only natural nuclear fuel, and the nuclear energy industry must rely on uranium. Because the nuclear energy industry has two purposes, peaceful and military applications, uranium has become a special commodity metal, and its production is affected by political, social, and economic factors. In the 1940s and 1950s, uranium was mainly used for nuclear weapons, and after the 1950s, it was mainly used for nuclear power generation. The world's uranium output has been oversupply for a long time, and there are large stocks. The price of U3O8 per kilogram in the international market dropped from US$97 in early 1978 to US$19.84 in 1990. The annual output of uranium in Western countries also dropped from 43960t in 1980 to 35278t in 1985. However, during this period, nuclear power plants developed rapidly and were built frequently in various countries. The total installed capacity in 1980 was 135 million kW, which increased to 318 million kW in 1989. The annual output of uranium in 1985 was lower than the requirement for nuclear power generation.

Atomic bomb (nuclear bomb)

The content of 235U in uranium material is higher than 0.7%, which means enriched uranium. Uranium is an important nuclear fuel and core material for atomic bombs. All uranium materials used today need to be refined and enriched to achieve a certain purity. FWhen launching underwater, the missile is in contact with water, which is called "du wet". When launching underwater, the missile is placed in a container. After the container comes out of the water, the lid is opened and the missile is launched. This launch method does not touch the missile itself. Water is called "dry" launch.

Cold launch means that the missile is not ignited by itself and then flew away. Instead, the missile is blown out for a certain distance and then ignited by means of steam, gas, high-pressure gas, etc.

Hot launch means that the missile is ignited by itself first and fly out with its own engine (similar to rocket launch). This type of missile’ s gas outlet needs to be designed separately

Wet launching generally cannot be launched with heat, otherwise, the water will be heated by the missile's engine to produce steam, which will affect the control of the missile.

or example, at least 20-50 kilograms of highly enriched uranium is required to make an atomic bomb (of course, plutonium can also be used to make an atomic bomb), and its enrichment purity should reach more than 90%.

The content of 235U in uranium ore is very low, most of which are 238U. Uranium ore cannot be directly used as fuel like coal. It is similar to briquettes that are mostly sediment and cannot be burned. The abundance of uranium element isotopes can be increased by technological processing to obtain a certain isotope enriched by the element, such as 235U. The physical properties of 235U and 238U are slightly different, mainly due to the difference in relative mass, which leads to the formation of compounds. The particle quality will vary slightly. Using the different atomic weights of uranium natural isotopes for separation can make the ratio of 235U to 238U in the uranium material higher than that of natural uranium, thereby obtaining the fissile material-enriched uranium. "Enrichment" mainly refers to an isotope separation process that increases the abundance of a specific isotope of an element, such as the production of enriched uranium from natural uranium or the production of heavy water from ordinary water.

The purpose of enriched uranium isotope is to increase the relative abundance (concentration) of 235U relative to 238U, etc., so that the relative content of natural 235U is higher than 0.7% of uranium, that is, enriched uranium. Only when the content of 235U in uranium fuel reaches more than 3% can it be sustained. "Combustion"; enriched uranium includes: 3%, 3.5%, 20% enriched uranium and other varieties.

Nuclear wars generally include nuclear wars and limited nuclear wars. Nuclear war refers to a war between nuclear powers and their alliances in which nuclear assaults with strategic nuclear weapons play a decisive role. A limited nuclear war is a war in which tactical nuclear weapons are used in a certain area, or a war in which a few nuclear weapons are used to attack a few military targets. Strategic nuclear weapons are more destructive than tactical nuclear weapons. But the harm caused by both is the same, both are nuclear wars. Air launches, land missile launches, and submarine launches all become nuclear warfare.The uranium used in many nuclear reactors and nuclear weapons must be enriched, that is, the concentration of 235U that is prone to nuclear fission must be increased, and then it must be made into fuel. The concentration of 235U uranium fuel used in nuclear reactors of most nuclear power plants is about 3% and not more than 5%. The 235U concentration of uranium material in nuclear weapons must be above 90%; the uranium fuel used by nuclear ships is uranium with a concentration of 20% or lower. The International Atomic Energy Agency defines: 235U uranium material with an abundance of 3% belongs to low-enriched uranium used in nuclear power plants, often uranium salt or uranium oxide; uranium material with an abundance greater than 80% is highly enriched uranium, and uranium with an abundance greater than 90% is Weapon-grade (military) highly enriched uranium is mainly used to make nuclear weapons; another classification is: highly enriched uranium, low enriched uranium (2%-20%, commercial enriched uranium), micro-enriched uranium (0.9%-2%) and Weapon-grade enriched uranium (above 90%). Reaching 20% of uranium enrichment is a node and a difficult point, and it is a relatively easy process to build an atomic bomb, thereby increasing the uranium enrichment.

Obtaining uranium materials needs to go through a series of complex processes, including prospecting, mining, beneficiation, leaching, smelting, and refining processes. Separation and enrichment are the main

Whether it is the peaceful use of nuclear energy or the manufacture of nuclear weapons, enriched uranium is necessary. As of November 2006, most of the 470 commercial nuclear power reactors operating or under construction in the world were fueled by enriched uranium; by 2010, there were at least 1,600 tons of highly enriched uranium (and 500 tons of plutonium) in the world. Many countries in the world (the United States, Britain, the Soviet Union (Russia), etc.) independently master enriched uranium production technology, and other countries also have them.

After the atomic bomb exploded, a large amount of radioactive dust would fall to the ground as the mushroom-shaped cloud drifted away, causing exposure to human body or skin burns, and severe cases would eventually lead to death.
Nuclear chemistry mainly studies nuclear properties, nuclear structure, the laws of nuclear transformation, the chemical effects of nuclear transformation, and peculiar atomic chemistry. It also includes the application of related research results in various fields. Nuclear chemistry, radiochemistry, and nuclear physics are not only different in content, but they are closely related and intertwined.

Nucleus is divided into unstable and stable. The former is also called radionucleus. Radioactive nuclei undergo decay (such as emitting helium nuclei, electrons, photons, neutrons or protons, capturing electrons and spontaneous fission, etc.) and eventually become stable nuclei. Any decay process must obey some rules of conservation of energy, conservation of momentum, conservation of angular momentum and quantum mechanics. Nuclear instability has a difference in degree, which is expressed in the length of life or half-life. The shorter the life, the higher the instability, and vice versa.
In addition to decay mode and stability, other properties of the nucleus include charge, mass (including energy), radius, spin, magnetic moment, electric quadrupole moment, parity, and statistical properties. In addition, the nucleus can not only be in a relatively stable ground state, but also in an excited state with a slightly higher energy. The nucleus in the excited state also has the above properties, and generally reaches the ground state by emitting photons. The nature of the nucleus reflects the structure of the nucleus. Through the study of the nature of the nucleus, we can have a deeper understanding of the nature of the nucleus.

The structure of the nucleus plays a decisive role in the change of the nucleus. By studying various experimental data of nuclear structure, it provides a reliable basis for the utilization of nuclear energy. The basis and starting point of nuclear structure research are nuclear physics experiments, including experiments on spontaneous decay and fission of atomic nuclei and nuclear reaction experiments. The basic problems in nuclear structure research are nuclear force, equations of motion and many-body problems, quantum mechanics, high-energy physics, etc.

Including the various changes and reactions of atomic nuclei under the action of other atomic nuclei or particles and the spontaneous nuclear decay of unstable atomic nuclei. Nuclear reaction is the main way to obtain new nuclei.

The nuclear reaction caused by the neutrons produced by the reactor is an important source of new nuclei. It mainly includes neutron capture reaction and neutron fission reaction. In 1911, British physicist Rutherford proposed a nuclear structure model based on the experimental phenomenon of alpha particle scattering. The experiment was rated as one of the "most beautiful experiments in physics".

The discovery of protons In 1919, Rutherford did an experiment to bomb nitrogen nuclei with alpha particles. He shot a particle from the nitrogen core and measured its charge and mass. Its charge is one unit, and its mass is also one unit. Rutherford named it a proton.

Through the study of the scattering of matter by alpha particles, he irrefutably demonstrated the nuclear model of the atom, thus leading the study of atomic structure on the right track in one fell swoop, so he was hailed as the father of atomic physics. Because of the contradiction between the stability of the electron orbit, the atomic structure, and the classical electrodynamics, Bohr put forward a revolutionary quantum hypothesis that deviated from the classical physics and became the pioneer of quantum mechanics.

The realization of artificial nuclear reactions is another major contribution of Rutherford. Since the radioactive decay of the element was confirmed, people have been trying to use various methods, such as arc discharge, to achieve the artificial decay of the element, but only Rutherford found the correct way to achieve this decay. This method of bombarding the nucleus with particles or gamma rays to cause a nuclear reaction soon became an important means for people to study the nucleus and apply nuclear technology. In his later years, Rutherford was able to use artificially accelerated particles to cause nuclear reactions in the laboratory. The split nuclei produced by these reactions are all on the neutron-rich side of the $\beta$-stability line and decay in the form of electrons.

The new nucleus can also bombard various target nuclei with ions (uranium hydrogen) and electrons of different energies produced by various accelerators, as well as secondary particles produced by nuclear reactions (such as fast neutrons, photons, pions, muons, etc.) To produce. According to different bombardment particles, nuclear reactions can be divided into neutron nuclear reactions, charged particle nuclear reactions, photonuclear reactions and heavy ion nuclear reactions. According to the energy of bombardment particles, they can be divided into high, medium and low energy nuclear reactions. Einstein, the mass-energy formula: E=m*c^2, the particles with the energy of each nucleus higher than 10 electron volts are called high-energy particles, those with 10 to 10 electron volts are medium-energy particles, and those below 10 electron volts are Low-energy particles. However, this type of regulation is not absolute. For various bombarding particles such as heavy ions, electrons, and secondary particles, the meaning of energy level is different. These nuclei produced by accelerators are mostly on the neutron-deficient side of the $\beta$-stability line and decay by emitting positrons, trapping electrons, or emitting protons.

According to the above two approaches, more than 2,000 unstable nuclides have been found, but there are still many to be discovered. Their lifespan is extremely short, and rapid transport of product nuclei, rapid chemical separation and isotopic separation techniques are required to identify them. The nuclear reaction of heavy ions is the main way to discover new elements (nuclear chemistry).

In addition, the research on nuclear reactions also includes measuring various nuclear reaction cross-sections and their relationship with the energy of bombarding particles, such as excitation function, measuring the distribution of the mass, charge, energy and angle of the emitted particles and product

nuclei, and thus Explore the mechanism of nuclear reactions. This is an important method to deeply understand the laws of nuclear force and nucleus movement and interaction in the nucleus.

In the nuclear transformation, the product nucleus obtains recoil kinetic energy due to the conservation of momentum, which is enough to break the chemical bond between the atom of the initial nucleus and the surrounding atoms, thereby forming a thermal atom with a certain kinetic energy that separates from the original molecule. The mass-energy equation $E=mc^2$, E represents energy, m represents mass, and c represents the speed of light (constant, c=299792.458km/s). Proposed by Albert Einstein. Expression form Expression form 1 $E0=M0C^2$ In the above formula, M0 is the rest mass of the object, and E0 is the rest energy of the object. In nuclear decay, it sometimes causes chemical changes due to electron shock or hole cascade. The chemical change between the hot atoms produced in the nuclear transformation and the surrounding medium is the content of thermoatomic chemistry.

The electrons or protons in ordinary atoms are replaced by other elementary particles to form strange atoms, such as positrons and muons. Strange Atomic Chemistry mainly studies the influence of the chemical environment on peculiar atoms, and uses peculiar atoms to study the structure of matter and chemical reactions.

The chemical operations and separation techniques used in nuclear chemistry research are different from those used in general chemical analysis. This is mainly because the former focuses on fast speed and high radioactive purity, and the general recovery rate is 20%-50%. For nuclides with extremely short half-lives, in order to gain speed, the recovery rate is allowed to be lower than 20%-%25. In principle, the separation methods in general chemical analysis can be used in nuclear chemistry research, but for nuclides with short half-lives, rapid separation steps such as thermal chromatography and recoil technology are required. Radioactive purity refers to the relative content of radioactive impurities in the final product and the radionuclide to be tested. The lower the relative content of radioactive impurities, the higher the radioactive purity. As long as it does not affect the recovery rate determination, the requirements for chemical purity are not very high.

Generally, the quality of the radioactive material in the sample is very small. In order to determine the recovery rate and facilitate purification, it is often necessary to add a certain amount of stable isotope of the nuclides to be tested as a carrier. In addition, in order to improve the radioactive purity of the product, it is sometimes necessary to add impurity elements as an anti-carrier and use a scavenger to carry out repeated precipitation to improve the radioactive purity of the product. In order to prepare products with high specific activity or without stable isotope and other derivatives, non-isotopic carriers with similar chemical properties must be used, and they must be removed in the final separation step. In terms of quantitative determination, radioactivity measurement is used in nuclear chemistry research. The method of sample preparation, especially the preparation of extremely thin samples with an areal density of less than 100 $\mu$g/cm, and the design and use of various counting techniques are crucial.

Nuclear Chemistry-Weapon Applications Nuclear chemistry research results have been widely used in various fields. For example, by measuring the neutron activation analysis of the neutron capture A(n, $\gamma$)B reaction, the content of more than 50 elements in the sample can be determined more accurately, and the sensitivity is generally high; this method has been widely used in materials science, Environmental science,

biology, medicine, geology, cosmology, archaeology and forensic science. Some radiolabeled compounds of short-lived nuclides are widely used in medicine. Thermal atom chemistry methods can be used to prepare certain labeled compounds. Positron annihilation technology has been used in the research of materials science and chemical kinetics.

Nuclear and chemical weapons have tremendous destructive power and can be widely used on the battlefield with missiles, rockets, aircraft, artillery and other projection tools. Therefore, in combat under modern conditions, the protection of these three types of weapons has become an important part of combat support. The armed forces of many countries attach great importance to research and take corresponding measures to strengthen the defense capabilities of the armed forces and military facilities, and have specialized troops for preventive protection.

The ultimate nuclear strategies of the United States and Russia are both "global destruction" strategies; nuclear powers have built an automated nuclear counterattack system-the "dead-hand system", which can automatically strike pre-set strikes when the head command organization is eliminated. aims. That is to say, once the country's highest authority and command system are eliminated or paralyzed by a nuclear assault, the "dead hand system" will automatically issue nuclear codes and nuclear strike instructions. US Army B1 Lancer stealth strategic bomber. Compared with the Ohio class, the diameter of the pressure hull has increased from 12.8 meters to 13.1 meters, and the number of missile launch tubes has been reduced from 24 to 16-the current Ohio class SSBN actually carries 20 missiles per ship according to the disarmament agreement. The underwater displacement has been increased from 18,740 long tons to 20,810 long tons. The missile launch tube has an inner diameter of 87 inches/2.21 m. It is suitable for the Trident D5 submarine-launched ballistic missile. There are 4 launch tubes in one group and a design life of 42 years. Natural circulation reactor + electric drive + pump injection means extremely excellent quietness. This will be the first time that mold has used electric transmission technology on a mass-produced nuclear submarine. Since the reactor does not need to be refueled throughout the life of the reactor, the midlife overhaul time is expected to be reduced from 4 years in Ohio class to 2 years.The system is connected to hundreds of intercontinental missiles and can automatically assign targets. This system does not distinguish whether the target of the attack is the target of the attack, but only strikes according to a predetermined procedure. Once a country launches a nuclear assault on the head of Russia and its command organization, it will activate the "dead hand system", which will definitely trigger a global nuclear war.

(2) Nuclear submarine-strategic bomber-land-based nuclear missile and space weapon-modern warfare

Performance list of active strategic bombers [performance of active strategic bombers-Strategic Bomber (Strategic Bomber) is a type of bomber, a large military aircraft that drops bombs from a high altitude to the ground. America’s Cold War Weapons: B-2 Stealth Strategic Bomber

Military area N concern

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For patients with back pain and leg numbness for more than two years, please take a few minutes to see this method

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[Magic Recipe] Plain water + it, after drinking, excrete huge stool! No belly

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A person who has been eating honey for a long time has become like this. No matter how busy he is, I have to look at it...

The B-2 Spirit stealth bomber is the most advanced bomber in active service in the United States and the only stealth strategic bomber in the world. It is difficult to be detected by radar. At present, apart from the actual combat and drills announced by the US military itself, no one can truly grasp the whereabouts of the B-2 bomber, and there is no record of missile attack.

The B-2 bomber was also a product of the Cold War. If it hadn't been for the frequent appearance of B-1B strategic bombers in the coastal waters of China recently, people would have almost forgotten them. B-1B can show his face, but B-2 can't show his true face easily, and may have been secretly dispatched, but no one can know. If someone can grasp the whereabouts of B-2, it proves that B-2's stealth function has failed. B-2 is expensive to build, and also expensive to maintain, so it will not be deployed as frequently as B-1B. Once the B-2 is dispatched, it may perform a real strategic strike mission, and the opponent will only be able to judge that the B-2 bomber has come after being hit.

After the end of the Cold War, the sky-high B-2 seemed to lose its value. Today, the U.S. and the CCP are in confrontation. The B-1B has already been dispatched. Perhaps it is also warning the CCP that there may be B-2 dispatched at any time. The B-2 stealth bomber is finally worth the money.

The B-2 stealth bomber has always been an American dream

The stealth advanced strategic bomber has always been the most desired by the US military. It was originally envisaged to start almost at the same time as the B-1 bomber. However, due to the difficulty and time of technological development, the B-1 bomber, as a transitional model, was first introduced in the late Cold War. It was not until 1997 that the first batch of six B-2 bombers were officially put into service. At that time, the Cold War had ended, a large number of orders were cut off, and only 21 have been produced. The initial cost of each B-2 was US$2.4 billion, which is 2-3 times more expensive than gold based on unit weight.

The B-2 bomber is mainly used to carry out penetrating attack missions, covertly penetrate into enemy territory, and can throw nuclear and other conventional weapons. The B-2 bomber combines various low-vision technologies with high-efficiency aerodynamic design, can carry a large amount of ammunition, and its performance is far ahead of all previous bombers.

During President Carter's time, because of the expensive and advanced B-2 stealth bomber project, other B-1 bomber projects were cancelled. During Reagan's administration, due to concerns about the delay of the B-2 plan, the B-1 plan was resumed. Throughout the development process, the cost of B-2 continued to increase. In the late Cold War, the role of bombers was no longer prominent. The procurement plan for 132 B-2 bombers was reduced to 75; after the end of the Cold War, it was reduced to 21.

The United States finally has the unique stealth strategic bomber in the world. After the Cold War, the US military greatly improved the B-2’ s conventional high-precision strike capability.

Experience of the B-2 bomber

In 1999, during the Kosovo War, six B-2s flew directly to Kosovo from the Missouri base in the continental United States, flying a total of 30 hours. The B-2 bombers only dispatched 50 sorties out of NATO's 34,000 air strikes, but dropped 11% of the total bombs. B-2 dropped a total of about 600 bombs at that time, using GPS satellite-guided JDAM smart bombs, effectively replacing the controversial carpet bombing to avoid civilian casualties.

On May 7, 1999, a US B-2 bomber dropped five smart bombs at the Chinese Embassy in Yugoslavia.

In the Iraq War that began in 2003, until 2011, the B-2 bomber dropped a total of 1,500,000 pounds (680,000 kg) of ammunition, including 583 JDAM smart bombs.

In 2011, in the no-fly zone in Libya authorized by the United Nations, three B-2 bombers dropped 40 bombs at Libyan airports.

In 2013, two B-2 bombers flew from Whiteman Air Force Base in Missouri to South Korea for exercises. They flew 13,000 miles (21,000 kilometers) and then dropped simulated bombs at the Jik Do target range.

On January 18, 2017, B-2 bombed an ISIS training camp 30 kilometers southwest of Sirte, Libya, killing about 85 terrorists.

B-2 stealth bombers are generally deployed in the United States. As the US-China confrontation unfolds, the B-2 may be deployed to Hawaii, Guam, Japan, and South Korea.

Features of the B-2 bomber

The B-2 has a maximum flight altitude of 15,000 meters, an internal fuel of 11,000 kilometers, and a maximum flight speed of Mach 0.95, which is close to the speed of sound.

The B-2 has low visibility and stealth capabilities and can safely pass through tight air defense systems to attack. The B-2's stealth function not only greatly reduces radar detection, but also reduces different signals such as infrared, visible light and noise, so that the possibility of being detected and locked is minimized.

Most of the body of the B-2 is made of composite materials to meet the requirements of high strength and low weight. At the same time, composite materials can also absorb most of the radar signals and greatly reduce the radar cross section. It is generally believed that the maximum radar cross-sectional area of the B-2 bomber is only 0.1 square meters, almost like a big bird.

The B-2 bomber requires only two pilots, and if the mission requires it, it can also carry a third pilot. B-1B requires four flight crew members, and B-52 requires five.

B-2 uses a large number of automated operations. During most flights, only one pilot is required, and the other pilot can rest at the same time. This is crucial in remote missions.

Precisely because the B-2 is far more advanced than the bombers of various countries, it is also a target for theft by various countries.

In October 2005, Noshir Gowadia, an engineer working on the B-2 propulsion system, was arrested because he sold B-2 confidential information abroad. He was eventually sentenced to 32 years in prison.

After the end of the Cold War, the B-2 stealth bomber was upgraded many times to adapt to conventional strike missions.

Weapons that the B-2 bomber can carry

There are two bomb bays inside the B-2. The ammunition is stored on a rotating launcher or two bomb racks. It can carry 40,000 pounds (18,000 kg) of various weapons, including:
16 B61 or B83 nuclear bombs
16 Rotary Launcher Assembly (Rotary Launcher Assembly)
80 GPS guided bombs JDAM
16 2,000-pound general purpose bombs Mark 84
36 750-pound cluster bombs
2 5,000 lb GBU-28 Bunker buster (Bunker buster)
2 GBU-57 Massive Ordnance Penetrator
Long-range air-to-surface missile AGM-154 or AGM-158 (JASSM)
related searchThe definition of a modern strategic bomber, based on the Soviet-U.S. "Phase I Treaty on Reduction of Offensive Weapons" signed on June 1, 1990, is considered a "strategic bomber" if one of the following two conditions is met:
The voyage is greater than 8000 kilometers. For air-launched missiles, range refers to the maximum arc length of the surface that can be reached under the standard design mode of flight until the fuel runs out. For ballistic missiles, the range is the arc length projected on the surface by the flight trajectory between the launch point and the reentry point. Modern strategic bombers generally have a range of about 10,000 kilometers. It carries a large amount of bombs and is mainly used to strike the enemy's deep and high-value targets. Destroy the resistance of the enemy's military and civilians. Generally, there are even-numbered engines (4-8). OWhen launching ballistic missiles underwater, the submarine generally sails at a depth of 30 meters to 40 meters (range) underwater, and sails at a speed of about 2 knots. The missile is placed in the launch tube, which is installed vertically in the middle of the submarine. Inside the pressure shell, some are located between the pressure-resistant shell and the non-pressure-resistant shell. Generally, each boat carries 12 to 24 missiles. At a water depth of 30 meters, the outside of the launch tube cover bears a water pressure of about 3 atmospheres. Therefore, in order to open the cylinder cover is very laborious, you must first pressurize the cylinder with high-pressure air, so that the cylinder cover can be easily opened after the pressure inside and outside the cylinder is approximately equal. In order to prevent a large amount of seawater from pouring into the missile launch tube when the cover is opened, a watertight diaphragm is deliberately installed on the tube mouth.
When launching, the upper cover of the missile launching tube is opened. Because the launch tube is a watertight and airtight structure, and after inflating and filling with a small amount of seawater, the pressure is equal to the seawater pressure. There is no pressure difference, so seawater cannot enter the tube. The gas will not overflow the water. After receiving the launch command, the electric explosive tube detonates and ignites the gas generator, causing the high-temperature and high-pressure gas to be sprayed into the barrel from the bottom of the launching barrel. Driven by the reaction force, the missile will penetrate the watertight diaphragm and push it straight out of the barrel. . The missile that exits the barrel is boosted by the first-stage rocket and soars into the sky. After flying for about 20 to 30 kilometers, the second-stage rocket performs a relay boost, then pushes the missile into outer space and flies according to the predetermined ballistic trajectory. , And then enter the atmosphere to attack the target.
ld-fashioned strategic bombers usually have more than 6 personnel. Now electronic technology has advanced. 1-2 people are enough. For an aircraft, the range is the maximum distance that can be flown in

the most economical mode without air refueling with 7500 kg of ordnance. After landing, the internal fuel is less than 5% of the maximum capacity of the fuel tank.
It is equipped with a "long-range air-launched nuclear warhead cruise missile." Among them, the range is the range of the previous air-launched missile, and it reaches 600 kilometers.
Accordingly, the 5 series of bombers are called strategic bombers:
United States: B-1B, B-2A, B-52G/H, etc.
(Former) Soviet Union: Tu-95 series, Tu-160, etc.
For the Tu-16 and Tu-22M3 series, which can carry 600 kg nuclear warhead anti-ship missiles, stop using and destroy nuclear weapons and are not classified as strategic bombers. B-The U.S. Air Force has 21 B-2 bombers in service, all of which belong to the 509th Wing of the U.S. Air Force Combat Command and are based at Whiteman Air Force Base in Missouri, but only 16 B-2s are responsible for combat readiness. The B-2 aircraft has experienced three models from development to equipping the troops. At the initial delivery, 6 were test aircraft, 10 were "Brock-10" aircraft, 3 were "Brock-20" aircraft, and 2 were "Brock-30" aircraft. In June 2000, all "Brock 10, 20" B-2 bombers were upgraded to "Brock-30" aircraft. 1B also dismantled the AGM-86B missile launcher in accordance with the treaty and was no longer included in the strategic bomber team. Stealth technology is used in all stages of design to effectively control and reduce the target characteristics of the aircraft.-Shape design-Material selection-Structural design-System design and equipment selection. The latest information shows that the United States, Russia, China, Europe and other countries have different developments and changes.

While military satellites have brought great convenience to one's own military operations, they also made the other side see its huge potential threats. Therefore, since the 1960s, military powers such as the United States and the Soviet Union have been committed to the development of anti-satellite weapons such as "anti-satellite", "anti-satellite with satellite" and "anti-satellite with energy" and used them as control Space, important weapons and equipment to seize the power of heaven. There are various types of anti-satellite weapons, but from the perspective of their killing mechanism, the anti-satellite weapons that have been developed and are currently being developed are mainly divided into five types:
Nuclear missile
The use of nuclear warheads to explode near the target spacecraft to produce strong thermal radiation, nuclear radiation and electromagnetic pulse effects, destroying the structural components and electronic equipment of the spacecraft, or making it incapacitated. It has a long range of action, a large offensive kill radius, and can still destroy the target even when the weapon's own guidance accuracy is poor. However, the shortcomings of nuclear missile anti-satellite weapons are low accuracy and large additional destructive effects, which are likely to pose a threat to one's own satellites, and once used, there is a danger of nuclear war.

The nuclear bomb-grade power supply is a miniaturized tactical nuclear weapon. It is a nuclear fusion weapon. It uses two 470 μ F, 200V voltage-resistant capacitors as explosives. Compared with the general hydrogen bomb, the atomic bomb neutron source is greatly reduced in volume, and thermonuclear Fusion

has no critical mass limit, which makes the entire power supply very small and light. The general standard is only the size of an ITX power supply, but the explosive equivalent can reach trillions of tons, which can easily kill tens of millions of people in any super city.

Kinetic energy anti-satellite weapons rely on the momentum of high-speed moving objects to destroy the target, usually using rocket propulsion to increase the warhead to a high speed and make it directly collide with the target spacecraft to destroy it. At the same time, the high-energy explosive blasting device carried by the warhead can also explode near the target, causing large damage and then producing dense metal fragments or shotguns to destroy the target. Anti-satellite weapons using this method of destruction require high precision

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Directed energy anti-satellite weapons emit high-energy laser beams, particle beams, and microwave beams to directly irradiate and destroy targets. The weapons that use these types of beams are usually called high-energy laser weapons, particle beam weapons, and microwave weapons. Using directed energy to destroy space targets has the advantages of repeated use, fast speed, and wide attack area, but it is technically difficult, vulnerable to weather, and the effect of destroying targets is difficult to evaluate. For example, high-speed missiles.

An anti-satellite satellite is a satellite with a blasting device. It uses its own radar infrared to detect and track the target on the same orbit as the target satellite, and then approach the target satellite within tens of meters or more accurately Within the range, the satellite warhead loaded with high-energy explosives will be detonated, generating a large amount of debris and destroying the target. Currently, the US Army and Air Force are stepping up the development of anti-satellite weapons.

The average service time of the US "Ohio" class strategic nuclear submarines in active service is estimated to be 44 years. Therefore, by the 2020s, the US Navy does not need to replace this class of ships. Among them, the four modified "Ohio" class are expected to serve until 2027 to 2028. By the time of I/2008, the "Ohio" will be re-commissioned as the first cruise missile nuclear submarine, 22 of the 24 missile launching tubes on the boat will be changed to be capable of carrying 7 tactical "tomahawks" each Missile launcher. In addition, &ie=utf-8&src=internal_wenda_recommend_textn" on the deck board can also carry a dry deck transport device or an advanced "seal" unit to transport the submarine (or one of each of the two transport devices). Modified Four "Ohio"-class nuclear submarines will replace nuclear reactors with the latest sensors and communication systems. In addition to the four expected to be converted into cruise missile nuclear submarines, the remaining 14 "Ohio"-class "Alaska" The modification was completed in February 2002 and equipped with the "Trident" D-5 ballistic missile.

The total number of attack nuclear submarines in service in the United States in 2002 was 53. When the first "Virginia" class was ordered in 1998, the construction cost was US$4.2 billion. By the beginning of 2002, its construction cost had increased by US$341 million. This limits the speed of ordering one ship per year. If the construction of the "Virginia" class is completed as planned, the United States will end up with only about 30 attack nuclear submarines. The five key development directions of American submarines are networking, modularization, electrification, heavy load and multi-purpose. In 1998, the Special Task Force of the Defense Science Committee of the US Department of Defense submitted a report called "Future Submarines", which analyzed the development prospects of US submarines before 2020 and made recommendations on specific technical issues of future submarines. For this reason, the U.S. Navy is trying to improve the combat power of attack nuclear submarines in two ways. One is to refuel the long-lived but still effective "Los Angeles" class, and the other is to build a "Virginia". The speed of the stage is doubled. However, due to limited funds, these two approaches cannot be carried out at the same time. Moreover, the plan to build 30 "Virginia" class may be difficult to achieve, because the design of new nuclear submarines after the "Virginia" class has begun.

The first boat of the "Virginia" class was completed and commissioned in June 2004, and the fourth "North Carolina" of the class will be completed and commissioned by the end of 2007. However, its fifth ship will not join active service before 2010 and thereafter. It is possible to continue building the "Virginia" class nuclear submarine at the rate of one per year.

In 2004, the third and last ship of the "Seawolf" class, the "Jimmy Carter", will enter service. Although the "Sea Wolf" and "Connecticut" nuclear submarines with an underwater displacement of 9,137 tons are used as attack nuclear submarines by the US Navy, the "Jimmy Carter" is slightly different from the previous two.

Every country with nuclear submarines has built strong and secret bases for it. These bases are either built in hollowed out mountains, with entrances and exits set underwater, or the bases are covered with more than ten meters of solid concrete. Safety net, other protective measures. With the continuous development of marine equipment technology, new types of deep-sea equipment such as unmanned systems, preset systems, and fixed facilities have enriched the means for the Navy to enter the deep sea and perceive the deep sea, and stimulate the development of deep-sea combat concepts. Among them, the US Naval Strategic Research Group researched and proposed three deep-sea combat concepts: deep-sea confrontation warfare, deep-sea base operations, and deep-sea facility defense warfare from 1998 to 2016; Russia launched the concept of deep-sea special operations to break through the US anti-missile system and maintain nuclear deterrence. the study.

⑴Deep sea confrontation

The nuclear-powered submarines of the Russian Northern Fleet were launched from five naval bases on the Kola Peninsula: Silica Bay, Vijavo, Gadzhyevo, Severmorsk and Gremikha. It is Russia's largest and most important naval nuclear submarine base. The base is located in the Gulf of Silica close to the westernmost part of the Kola Peninsula, about 45 kilometers from the Norwegian border. The Silica Gulf faces the Motovsky Gulf from the inside of the Kola Peninsula, and crosses the Rybach Peninsula on the southeast coast. The base has only one town equipped with naval base equipment, called Zadersk, which is located 6 kilometers east of the center of the Gulf of Silica. Until the early 1980s, this town was called Severodvinsk

7 Base. Also known as Murmansk-150 or Zagerny. There are about 30,000 people in Zadersk, most of them the navy and their relatives. The city was established when the first naval equipment arrived in 1959.

The nuclear submarine base in the Silitsa Bay is actually composed of the Little Robatka base, the Big Robatka base, the Nierbicya base and the Andreev Bay base. Sirica Bay was considered for expansion from the late 1970s to the early 1980s. The total length of the base wharf is 20,600 meters. Usually, the latest submarines will be anchored in Silica Bay once they are in service, including attack submarines, strategic submarines and tactical submarines. Type 645 (K-27), 661-Baba class (K-162) and 685-Mike class (Komsomolskaya K-278) also park here.

There are only 12 Russian strategic nuclear submarines in existence, including 1 "Typhoon" class, 6 "D-lV" class and 5 "D-m" class. The last ship of "D-Ⅲ" class will be launched in 2005. Retire at the end of the year. After major repairs in the late 1990s, the first "Typhoon" class boat was named "Dmitry Donskoy" in October 2000. According to news media reports, after the memorial ceremony, the submarine was towed back to the factory. The refurbished "Dmitry Donskoy" strategic nuclear submarine was re-commissioned at the end of 2002 as a test platform for the new BULAVA-30 submarine-launched strategic ballistic missile. It is reported that this nuclear submarine will not be used for combat patrols until 2005. By then, the only ship of the Typhoon class that can be used for combat patrols, the "Severstar" may have been decommissioned.

Since the 1960s, the United States and the Soviet Union have been competing for space hegemony for decades (from Star Wars to space handshake and other aerospace), and gradually expanded the land, sea and air battlefields into outer space, causing major changes in the "time-space view" of war. Since military activities on the space battlefield are not affected by factors such as the earth, national borders, weather, etc., both parties in combat can take a full range of combat operations within the scope of orbital maneuverability, which enables combat in a real sense of flexibility. And coordination. In the space age, human expeditions to the moon and Mars are of great significance, and human transformation and immigration are possible. Space resources are vast, and the moon and Mars are of great significance.

Especially in the future information warfare, various reconnaissance, early warning, and communication satellites located on the space battlefield will be the core components of the military command automation system and become the first target of the opponent's attack. In order to gain the initiative on the three-dimensional battlefield of land, sea and air, the two sides of the war must first seize the "commanding height" of the space battlefield.

Historical wars, such as Hitler's blitz on Poland, the British air battle, the defense of Stalingrad, the Japanese attack on Pearl Harbor, the naval battle of Midway Island, and the Normandy landing battle. ,

Some military powers in the world, in order to meet the needs of their political, economic, and military interests, will never give up their competition and competition on the space battlefield. In particular, as high and new technologies are widely used in the military field, the military has increased its troops in space and its ability to compete for space has greatly improved. It is no longer difficult to conduct space operations. Therefore, the future competition in the space battlefield will break through the past purely technical weapons contests, and focus on the use of space forces, using space raids, space assaults, and space blockades to conduct military operations in the vast outer space. Big contest. At that time, an unprecedented space war will appear on the stage of world war with a brand new look.

The characteristics of the aerospace battlefield are the starting point and end point for studying air-space warfare, and the objective and theoretical basis for developing aerospace weapons, formulating aerospace strategies, and forming aerospace forces. This is one of the important issues in the revolution of military theory in this century.United States, Russia, United Kingdom, France, China, India

The United States regardless of quantity and quality. Strategic nuclear submarine Ohio class, attack submarine Los Angeles class, Seawolf class, Virginia class

Russia. Strategic nuclear submarine DIV class, Typhoon class, North Wind God class, attack nuclear submarine Akula class, Oscar class, Yasen class.

Britain, strategic nuclear submarine avant-garde class, attack nuclear submarine fast class, alert class

France Strategic nuclear submarine Triumph class, attack nuclear submarine Ruby class, Barracuda class

China’s strategic nuclear submarines 092 (Xia class), 094 (Promotion), attack nuclear submarines 091 (Han class), 093 (commercial class), etc. Of course, the latest information shows that new developments still exist.

Famous naval battles in world history include:

Sino-Japanese Sino-Japanese War

Battle of Ingama Island

Battle of Midway

Coral Sea Battle

Battle of Jutland

Battle of Helgoland Bay

Battle of the Falkland Islands

Sinop Battle

Ushakov's expedition to the Mediterranean

Battle of Vyborg

Battle of Trafalgar

Battle of Lowestoft

Battle of Navarino

Battle of Lisa

Kaliaklia, pta.

Battle of Cape Hanko

Battle of Gogran

Battle of Tsushima

Battle of Athos

Battle of Abukir

Luliang naval battle

The Battle of Economus Cape and so on.

Sign space-based surveillance satellites and set up a space attack team. At the beginning of the 21st century, the US military also conducted space warfare exercises in Colorado with the background of 2017. The exercise lasted for 3 days and a total of more than 250 people participated. Although a single shot was not fired, the curtain on space war has gradually opened. Reagan's Star Wars is the main driving force.

Russia also attaches great importance to the construction of military space forces and continuously improves the combat capabilities of space forces and weapons. In August 1992, Russia reorganized its space force, which was subordinated to the Ministry of National Defense, Launch Force, Measurement and Control Force, Military Astronautics Academy, and Central Research Institute of Space Weapons of the Ministry of Defense. On October 30, 1997, Russia merged its space force with its strategic rocket force and missile defense force, collectively referred to as the strategic rocket force. The main reason why Russia is confident in forming a space force is that it has mastered relatively complete theory and technology of space weapon systems.

The space force is assigned the task of launching various military spacecraft and attacking enemy space weapon systems. The Russian military has also included space combat operations into the scope of modern campaigns. Russia has clearly divided space into two theaters, a near-Earth space theater and a lunar space theater.

Japan has also stepped up the research and development of spacecraft and formulated a small satellite development strategy to enable spacecraft to develop in the direction of high performance, long life, multi-function and networking.

India began to develop low-orbit surveillance satellites that can monitor missile launches in 1999, and is preparing to develop small space shuttles that can be reused hundreds of times and enter orbit in a single stage. This small space shuttle will be used to launch small communications and missile satellites, or as a high-altitude supersonic aircraft for the aerospace and space fields.

Nuclear War-Nuclear Submarine-Space Weapon-Strategic and Tactical Research on Modern Warfare

The United States currently has 14 strategic missile nuclear submarines, and nearly one-third of the strategic missile nuclear submarines are on duty for combat readiness.

The Virginia-class attack nuclear submarine’s weapon load, speed, and submarine depth are not as good as the Seawolf class, but the silent ability inherits the super high water of the Seawolf class.

level. First of all, the main cabin of this class of nuclear submarine adopts a floating raft-type shock-absorbing overall module design, which greatly reduces the noise on the boat; second, this class of boat has the same latest mute technology as the Seawolf class, such as carefully designed turbines and Piping settings, the polyurethane monolithic silencing tiles that are said to be used on the outside of the hull, the outer shape design of the hull to reduce water flow noise, the elastic shock-absorbing base of the main

engine and the new pump-jet propeller, etc.; a total of all parts of the boat are installed 600 noise/vibration detectors (there are only 26 in the Seawolf class), which can monitor the vibration of various places on the boat at any time, and deal with any abnormalities immediately to minimize the overall noise; in addition, in order to reduce the probability of detonating induction mines, This class of boats also use degaussing technology and other methods. As early as 2001, the U.S. Navy disclosed the design details of the improved Virginia class. The most notable of these was the use of "advanced command podium enclosures" similar to the Russian Type 705 and Type 971 attack nuclear submarines, which not only improved the submarine’s performance The invisibility of shallow seas can increase the space inside the enclosure and install more detection equipment.

The overall design of nuclear submarine, the development of nuclear power plant, submarine line type, pressure hull, air conditioning system, underwater sound, navigation, communication and other seven key technologies. Nuclear submarine is a type of submarine, referring to nuclear reactors as the power source Designed submarine. Due to the production and operating costs of this submarine, plus the size and weight of related equipment, only military submarines use this power source. The nuclear-powered submarine has an underwater endurance of 200,000 nautical miles and a self-sustaining power of 60-90 days. As a strategic strike force, nuclear submarines can be equipped with ballistic missiles or flying missiles with nuclear warheads. According to weapons and equipment, it can be divided into torpedo nuclear submarine and missile nuclear submarine. Nuclear submarine is a strategic force in a country's submarines, and it is the main form of realization of the maritime-based nuclear force in the current military concept of the "trinity" of military nuclear energy. In military warfare, it has attracted much attention because of its strong endurance.

"Typhoon" class, the Soviet Union classified it as an underwater heavy ballistic missile nuclear cruiser. There is only one type of "typhoon" class,

The structure of the "Typhoon" class is completely different from the H, Y and D classes. The "Typhoon" class is equipped with solid-fuel missiles, which eliminates the "turtleback" phenomenon, and the price for this is to greatly increase the displacement of the boat. The water displacement of the "Typhoon" class is comparable to that of the guided missile cruiser "Peter the Great".

The "Typhoon" class has a water displacement of 23,200 tons and an underwater displacement of 48,000 tons; the maximum length is 172.8 meters, the maximum width is 23.3 meters, and the average draft is 11.0 meters. Nuclear power plant is OK-650 type, 2 pressurized water reactors, total power of 380 MW gear-driven steam turbine main unit 2×50,000 horsepower, 4 autonomous turbine generators 4×3200 kW; double propeller, 7 blades Low-noise fixed-pitch propeller, in the propeller duct; auxiliary power diesel generator 2×800 kW; lead-acid battery, auxiliary propulsion motor 2X190 kW; 2 outreach rotatable propellers, driven by electric motors, 750 kW. The maximum speed is 12 knots on water and 25 knots underwater. The dive depth is 400 meters, self-sufficiency for 120 days, 160 crew members. Each boat is equipped with 2 crew members. For the main tactical and technical elements of the "Typhoon" class, there are other changes.

The most unique aspect of the typhoon class is its structural form, an atypical double hull structure. There are several pressure hulls in the non-pressure hull.

Because the size and weight of the P-39 missile (NATO codename SS-N-20) are much larger than any previous liquid fuel missiles, and the boat is equipped with a sonar with better performance, size and weight. Electronic equipment such as radar, radar, etc. makes it difficult to adapt to the traditional double-hull structures like H-class, Y-class and D-class submarines.

If the missile launching tube is arranged in a pressure hull, a 16.0-meter-long P-39 missile must be arranged like a D-class nuclear submarine. That is, if the diameter of the pressure hull is expanded to more than 12 meters, there will still be one. A big "turtle back". The P-29PM of the D-4 missile is only 14.8 meters long, and the diameter of the pressure hull is only slightly larger than the 9.4 meters of the D-1.

In order to avoid the occurrence of "turtle back", the typhoon class has designed two pressure hulls parallel in the horizontal plane, which can be called "main pressure hulls". The missile launch tube is arranged between the two main pressure hulls, not in the main pressure hull. The diameter of the two main pressure hulls is slightly enlarged at the stern of the boat, but in the section where the missile launching tube is arranged, the diameter is only 7.2 meters. Therefore, this arrangement is sufficient for the maximum width of 23.3 meters for the "typhoon" class. Because the diameter of the P-39 missile is only 2.4 meters, taking into account other factors (such as the layout of the missile in the launch tube) and the wall thickness of the launch tube, a width of 23.3 meters is sufficient. Twenty missile launching tubes are arranged on both sides of the center line, and the upper cover of the missile launching tube is opened to the side.

No missile launching tube is arranged in the pressure hull, which avoids opening large diameter holes in the pressure hull. If there are large-diameter openings, in order to ensure the strength of the pressure hull, the openings need to be reinforced with thick forgings and plate-rolled materials. Installing 20 missile launching tubes requires continuous openings on the pressure hull, which has a greater impact on strength. The safety of submarine structure is of paramount importance.

Behind the missile launching tube, the "mounted" is on the two main pressure hulls, and at the midline of the boat is a "pressure resistant central compartment". In the central compartment, the central command position and electronic equipment such as sonar and radar are arranged to become a pressure-resistant command platform. On both sides of the central section there is a floating rescue cabin, which can accommodate all crew members.

The method of setting the pressure-resistant podium in a horizontal pressure-resistant cylinder on the pressure hull has been used in large submarines in the past. This "old" layout is used in the "typhoon" class. . The current submarine usually sets the observation part of the periscope in the pressure hull, this pressure command cabin and two parallel main pressure hulls.

There is also a torpedo bay at the bow of the boat. The torpedo cabin has a torpedo launch tube, a spare torpedo rack, and a device for longitudinal and lateral transmission of torpedoes and a fast loading device. The torpedo cabin and the main pressure hull have channels, etc. Below the torpedo cabin is the spherical main array of the sonar station.

The stern part of the two main pressure hulls has an enlarged diameter to a maximum of 10 meters. Inside each of the two main pressure hulls, there are sets of main power units arranged in steps, each of which has its own nuclear power unit OK-650 and the main steam turbine, which are installed in the same space as the auxiliary engines. Inside the module of the damping system. . The "Advance Pass" group proposed a

floating launcher plan, which means that various weapons are arranged in a module that can float and return autonomously. This module can not only be arranged in the special cabin of future submarines, but also can be fixed on the hull of nuclear submarines in active service. , Thereby greatly improving the combat capability of the submarine. The "Collaboration 2020" group put forward a similar proposal called "low-cost stealth autonomous system." Other suggestions include: unmanned submersibles equipped with a variety of payloads (including combat payloads); multi-purpose modules (flexible payload modules) that can be placed in ballistic missile nuclear submarine missile silos or special cabins of future submarines ). U.S. military experts believe that the technology of unmanned submersibles on board is the key technology to improve the concealment and combat potential of nuclear submarines in the future. Therefore, they are currently actively researching unmanned submersibles that can undertake assault, mine clearance, reconnaissance, and underwater operations. . Such an arrangement is beneficial to reduce the vibration and noise of the power plant and improve the vitality of the power system. According to data released by Russia, the reactor can achieve natural circulation in the primary loop at higher power, that is, without starting the main pump, which can more effectively reduce the noise of the power plant.

The main pressure hull, the pressure-resistant central section and the torpedo compartment are made of titanium alloy, and the non-pressure hull is made of steel. A special rubber hydro-acoustic silencing tile is laid on the outer surface of the non-pressure boat to improve the concealment of the boat. It is said that the underwater sound concealment of the boat is close to the Ohio class of the United States and is the best of all ballistic missile submarines in the Soviet Union.

Due to its large body, the "Typhoon" class has a wide tail control surface. From the longitudinal view of the boat, it can be seen that there is a tail vertical stabilizer on the left and right sides of the stern, which is very similar to the Oscar-class tail layout. The US nuclear bomb launch procedure is very strict. 1. After the president decides to launch a nuclear bomb, the order will be communicated to the silo, and firstly through multiple procedures. Including more steps and procedures for nuclear submarine launch procedures.

2. If you remember correctly, the two people in the launch silo can use the password in the command to save two password cards with the last few digits of the password

3. After two people enter their passwords at the same time and operate at their respective locations, they can launch.

Russia has a famous nuclear lockbox. This lockbox-sized launch communication machine is specially used to issue nuclear weapons launch instructions. This system was first launched in 1983 and must be applied by the three brothers at the same time. Among them, the President of Russia, the Minister of Defense, and the Chief of General Staff carried them with them. No one can do all this alone, two people must do it at the same time. The three people each have their own two sets of passwords, and only if the four sets of passwords of two of them are successfully entered at the same time, the nuclear missile can be launched. Once the cover is opened, the launch button must be pressed within 3 seconds, otherwise the launch device will fail. No matter when, the nuclear lockbox cannot be separated from oneself. When the former Russian President Yeltsin was undergoing heart surgery, because of the need for anesthesia, he handed the nuclear lock box to Prime Minister Chernomyrdin for temporary custody. Yeltsin had just recovered from the operation and immediately recovered the nuclear password box. The president must, according to the several combinations set before the nuclear lock box, cooperate with the electronic map, and give

instructions to the secretary of defense or the chief of staff to attack the target. After the Secretary of Defense or the Chief of Staff has verified that they are correct, they will be sent to the nuclear missile force before they can enter the launch process.

The bow rudder is arranged at the fore end of the boat and can be retracted into the non-pressure hull. Since the podium enclosure is on the rear half of the boat, the enclosure rudder cannot be used. The podium enclosure and the superstructure deck have a strong ice-breaking reinforcement structure, which can cut through a 2-meter-thick ice layer and float up.

The "Typhoon" class has good habitability and created good living conditions for the crew. The officers live in two-person and four-person cabins. The cabins have wash basins, TVs, and air conditioners. Sailors and sergeants lived in cabins with few berths. There are also sports rooms, sauna rooms, swimming pools, medical rooms, rest salons, and activity rooms on board.

The Soviet/Russia has not published a general layout plan of the "typhoon" class so far. What you can see is a longitudinal section without the layout of the cabin equipment. The plan and cross-sectional views were not seen, and the Soviet/Russia never announced the shielding and channel settings of the reactor compartment. Therefore, it is generally difficult to understand the general layout of the typhoon level, which belongs to the category of confidentiality.

However, according to various Russian sources, there are 19 cabins in the "Typhoon" class. Only the torpedo compartment, missile compartment, central part and electronic equipment compartment, reactor compartment and steam turbine compartment are indicated on the longitudinal section. Some of the cabins are in the two main pressure hulls. For other cabins, no description is indicated on the longitudinal section.

The reserve buoyancy of the "Typhoon" class is great, but how many main ballast tanks there are and how they are arranged in the atypical double hull of the "Typhoon" class cannot be seen in the longitudinal section.

According to Russian information, the "Typhoon" class also has some special ballast tanks for floating submarines above the cruise waterline. This is because the typhoon-class draft is deep. If these ballast tanks are blown out, the draft of the boat is reduced, and it can enter the base of the Northern Fleet. According to analysis, these ballast tanks are not the main ballast tanks. They are not only full of water in the underwater state, but also in the water state (the cruise state where the main ballast tanks are completely blown off). Only when the submarine enters the base, in order to reduce the draught of the boat, the water in these ballast tanks is blown off. At this time, the main ballast tanks are blown off, and these "buoyancy tanks" are also blown off. When cruising, the "buoyancy chamber" must be filled with water in order to make the submarine dive quickly and shorten the dive time.

The installation of ballast tanks that provide buoyancy reminds people of the "buoyancy tanks" that existed in the development of submarines. In the early stages of submarine development, in order to take care of the submarine's surface navigation status, a "buoyancy cabin" was installed at the bow of the boat. The "buoyancy cabin" is filled with water when it is underwater. When sailing in wind and waves on the water, when the bow of the boat is buried under water, the buoyancy cabin will not enter the water, but provides buoyancy and does not make the bow sink.

2. TRIBON

This is the software currently used by most East Asian shipyards and design units, and it is very convenient to design. However, this software belongs to the special software of the shipbuilding industry, even professionals need a relatively long time to learn. South Korea is relatively mature in using this software, and there are many related secondary developments.

3. NAPA

The software is also a dedicated ship design software, which has very powerful functions in profile design. Especially in the design of large ships, NAPA has obvious advantages. However, there are not many domestic use NAPA.

4. CATIA

This is an excellent production design software, but its application in the shipbuilding industry is not very common. Although both TRIBON and NAPA make 3D models inside, CATIA can make 3D models move. CATIA's simulation function is very powerful, and it is likely to be the future development direction of the shipbuilding industry. But CATIA has very high requirements for computer performance, and generally it can only run on a very well-configured PC or a relatively high-end graphics workstation.

This answer is recommended by netizens

According to Vittorio Vagliani, Managing Director of Quinettik GRC, "Paramarine has become the world's leading naval architecture software tool in the field of submarine design." In addition, there are two fully integrated platforms to design and analyze newly established submarines and surface ships. Computer variants, sea ships and SeaWeigh are loaded onboard.

The company also launched the latest version of Paramarine's extended functions, such as probabilistic damage modeling and assessment, and enhanced its emergency response, reporting and stability assessment capabilities.

The main weapon of the "Typhoon" class is P-39 (NATO codename: SS-N-20) ballistic missiles

The P-39 (SS-N-20) missile is a ballistic missile specially designed for "Typhoon" class nuclear submarines. It uses solid fuel and a three-stage propulsion submarine-launched intercontinental ballistic missile. The length is 16 meters and the diameter is 2.4 meters. It has a launch weight of 90 tons, can carry 10 sub-warheads, has a range of 8000 to 10000 kilometers (various materials provide different data), and the circular probability deviation is 500 to 600 meters. The P-39 missile is the only two types of solid-fuel submarine-launched ballistic missiles that have been put into use by the Soviet Union (Russia). Solid fuel has the characteristics of short preparation time and safety (liquid fuel is usually toxic, flammable and explosive), but it also brings about the problems of increased launch weight, shortened storage time and reduced range. The first batch of missiles was delivered to the Navy in 1983, which means that the ballistic missiles of the submarine were lacking in the early stage of service of TK-208 and the trial period of TK-202. The P-39 missile is fired from a "dry" launch tube using a gunpowder pressure accumulator, which does not require water injection. A gas space is formed around the missile during launch, which greatly reduces the hydrodynamic load of the missile in the underwater movement section. After the missile comes out of the water, a special engine separates the missile launch damping system from the missile and throws it to a safe distance away from the submarine. Because the P-39 missile is too large in size and weight, the

Moscow Transport Machinery Manufacturing Bureau has also developed a special loading equipment, including a double-carrier overhead crane with a lifting capacity of 125 tons.

As the United States continues to improve its anti-missile means and plans to establish a missile defense system, the Soviet Union is also constantly studying and improving the combat survivability of its missiles in flight and improving shooting accuracy. One of the solutions is to study and improve the optical sensors for celestial navigation of ballistic missiles. In 1984, he organized various experts to participate in the research, and under the leadership of the experts, he developed a stable and reliable astronomical correction instrument for ballistic missiles, including missiles, missile control systems, commanders, and astronomical correction systems. Experts. The new astronomical corrector should be able to resume its working performance within seconds of a nuclear explosion in enemy space.

Although the displacement and boat width of the Typhoon class are almost twice that of the Ohio class, the first 8 American boats (SSBN726~733) are equipped with "Trident"-I (C4) missiles with a range of 7400km and each missile can carry 8 missiles. A sub-guided multi-warhead with a power of 100kt TNT equivalent (the 9th to 18th boats of this class (SSBN734~743) are equipped with "Trident"-Ⅱ missiles with a range of 12000km and each missile can carry 8-12 powers It is a 100kt or 300-475kt TNT equivalent sub-guided multi-warhead with a circular probability deviation of 90m), while the "Typhoon" class can only carry 20. The Ohio class still dominates in the number of missiles. But in fact, because each Trident missile carries 8 warheads, each P-39 missile can carry 10 warheads. In this way, 24*8=192, and "typhoon" level is 20*10=200. In nuclear explosions, the equivalent is about 0.1 megaton TNT (100,000 tons, 1 megaton = 1,000,000 tons), so the "Typhoon" class has the upper hand in the destructive power of a single ship. The biggest advancement between the P-39 and the previous Soviet missiles is that the "Trident" uses three-stage propulsion and solid fuel. In this way, there is no gap between launch preparation and range, and because the "Typhoon" class can fire two missiles in a row, the time it takes to launch all missiles is undoubtedly an advantage in the "Typhoon" class.

However, because the Soviet Union's solid-fuel ballistic missile technology is not as mature as the United States, there is still a lot of gap between the P-39 missile and the Trident missile. First, the launch weight of the P-39 is 90 tons, while the Trident II is only less than 60 tons, which caused problems such as increased recoil after launch. Secondly, in terms of accuracy, the circular probability error of the P-39 equipped with the "Starlight" astronomical guidance system is 500 to 600 meters, while the trident type is only 380 to 420 meters. Although the maintenance cost and manufacturing cost of the P-39 is not comparable to that of the Trident missile, it is also not a small figure for the Soviet (Russian) Navy, which is tight on funds.

The Typhoon-class nuclear submarine has 6 533 mm torpedo tubes and fast loading devices, which can be equipped with 22 torpedoes, including EST-53-65K, СЭТ-65 and САЭТ-60M and "waterfall" rocket torpedoes, and can also be replaced with mines.

In order to guard against low-altitude aircraft and helicopters, it is equipped with 8 "needle" air-to-air missiles, which can only be launched on the surface. In fact, this is not important, but there are reports in the West that Russia has designed self-defense air-to-air missiles for the "Typhoon" class and other new ballistic missile nuclear submarines that can be launched from underwater.

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In order to avoid the occurrence of "turtle back", the typhoon class has designed two pressure hulls parallel in the horizontal plane, which can be called "main pressure hulls". The missile launch tube is arranged between the two main pressure hulls, not in the main pressure hull. The diameter of the two main pressure hulls is slightly enlarged at the stern of the boat, but in the section where the missile launching tube is arranged, the diameter is only 7.2 meters. Therefore, this arrangement is sufficient for the maximum width of 23.3 meters for the "typhoon" class.The ocean is the treasure of the universe. The ocean is a brilliant pearl embedded in the earth. Astronauts overlooked the earth from space and discovered the blue ocean. There are trenches on the moon and Mars, but unfortunately there is no water. Many planets have seas, but lack water, or have disappeared. Humans, animals and plants will die without water. The ocean is so important, so are marine resources. This book does not discuss oceanography, but discusses the ghosts in the ocean --- nuclear submarines and strategic bombers, land-based nuclear missiles, etc. (nuclear war and space war, etc.). Is it completely different and completely irrelevant? I think the two are completely different, which is not bad. However, nuclear submarines are closely related to the ocean and are difficult to break away. The ocean breeds everything, and nuclear submarines are also used to grow, let the flow go. The ocean is a natural resource, and nuclear submarines are man-made rather than made of heaven. Navigating the ocean and cruising nuclear submarines, nuclear submarines can defend and destroy the ocean. For example, if a nuclear war triggers a big explosion on the earth, can the ocean still exist? Even if it exists, it will be completely polluted and poisoned. In a word, the ocean is also destroyed. A local nuclear war will also pollute the ocean. Therefore, this book focuses on the latter. Therefore, the ghosts in the deep sea-nuclear submarines and strategic bombing vehicles, land-based nuclear missiles, etc. (nuclear war and space war, etc.) are the focus of this book, and it is a very important topic. , No less than the importance of marine resources, this is self-evident. The reason why they are considered together is that the two are closely related, life and death. Of course, peace, freedom and rationality are the theme of mankind and the mainstream of development in the world for thousands of years. No matter how the world changes and evolves, or how the world order is chaotic or reorganized, world peace and liberal rationality are the most powerful. This is the purpose of this book.

Because the diameter of the P-39 missile is only 2.4 meters, taking into account other factors (such as the layout of the missile in the launch tube) and the wall thickness of the launch tube, a width of 23.3 meters is sufficient. Twenty missile launching tubes are arranged on both sides of the center line, and the upper cover of the missile launching tube is opened to the side.

No missile launching tube is arranged in the pressure hull, which avoids opening large diameter holes in the pressure hull. If there are large-diameter openings, in order to ensure the strength of the pressure hull, the openings need to be reinforced with thick forgings and plate-rolled materials. Installing 20 missile launching tubes requires continuous openings on the pressure hull, which has a greater impact on strength. Behind the missile launching tube, the "mounted" is on the two main pressure hulls, and at the midline of the boat is a "pressure resistant central compartment". In the central compartment, the central command position and electronic equipment such as sonar and radar are arranged to become a pressure-resistant command platform. On both sides of the central section there is a floating rescue cabin, which can accommodate all crew members.

The method of setting the pressure-resistant podium in a horizontal pressure-resistant cylinder on the pressure hull has been used in large submarines in the past. This "old" layout is used in the "typhoon" class. . The current submarine usually sets the observation part of the periscope in the pressure hull, this pressure command cabin and two parallel main pressure hulls.

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The stern part of the two main pressure hulls has an enlarged diameter to a maximum of 10 meters. Inside each of the two main pressure hulls, there are sets of main power units arranged in steps, each of which has its own nuclear power unit OK-650 and the main steam turbine, which are installed in the same space as the auxiliary engines. Inside the module of the damping system. Such an arrangement is beneficial to reduce the vibration and noise of the power plant and improve the vitality of the power system. According to relevant data released by Russia, the reactor can achieve natural circulation in the primary loop at higher power, that is, without starting the main pump, which can more effectively reduce the noise of the power plant.

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The reserve buoyancy of the "Typhoon" class is great, but how many main ballast tanks there are and how they are arranged in the atypical double hull of the "Typhoon" class cannot be seen in the longitudinal section. There is also Russian data that the reserve buoyancy of the "typhoon" class is 31.3%.

According to Russian information, the "Typhoon" class also has some special ballast tanks used to float the submarine above the cruise waterline. The event schedule of World Ocean Day and the follow-up activities of World Ocean Week (June 8-14, 2020) will explore innovations in various fields such as technology, system infrastructure, resource management, consumer products, finance, and scientific exploration. Outline the applications and potential impact of these innovations, and the resources needed to turn them into durable solutions. (United Nations official website)This is because the typhoon-class draft is deep. If these ballast tanks are blown out, the draft of the boat is reduced, and it can enter the base of the Northern Fleet. According to analysis, these ballast tanks are not the main ballast tanks. They are not only full of water in the underwater state, but also in the water state (the cruise state where the main ballast tanks are completely blown off). Only when the submarine enters the base, in order to reduce the draught of the boat, the water in these ballast tanks is blown off. At this time, the main ballast tanks are blown off, and these "buoyancy tanks" are also blown off. When cruising, the "buoyancy chamber" must be filled with water in order to make the submarine dive quickly and shorten the dive time.

The installation of ballast tanks that provide buoyancy reminds people of the "buoyancy tanks" that existed in the development of submarines. In the early stages of submarine development, in order to take care of the submarine's surface navigation status, a "buoyancy cabin" was installed at the bow of the boat. The "buoyancy cabin" is filled with water when it is underwater. When sailing in wind and waves on the water, when the bow of the boat is buried under water, the buoyancy cabin will not enter the water, but provides buoyancy and does not make the bow sink.

missile

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Navy in 1983, which means that the ballistic missiles of the submarine were lacking in the early stage of service of TK-208 and the trial period of TK-202.

The P-39 missile is fired from a "dry" launch tube using a gunpowder pressure accumulator, which does not require water injection. A gas space is formed around the missile during launch, which greatly reduces the hydrodynamic load of the missile in the underwater movement section. After the missile comes out of the water, a special engine separates the missile launch damping system from the missile and throws it to a safe distance away from the submarine. Because the P-39 missile is too large in size and weight, the Moscow Transport Machinery Manufacturing Bureau has also developed a special loading equipment, including a double-carrier overhead crane with a lifting capacity of 125 tons.

With the continuous improvement of U.S. anti-missile means and the plan to establish a missile defense system,

Although the displacement and boat width of the Typhoon class are almost twice that of the Ohio class, the first 8 American boats (SSBN726~733) are equipped with "Trident"-I (C4) missiles with a range of 7400km and each missile can carry 8 missiles. A sub-guided multi-warhead with a power of 100kt TNT equivalent, while the "Typhoon" class can only carry 20. The Ohio class still dominates in the number of missiles. But in fact, because each Trident missile carries 8 warheads, each P-39 missile can carry 10 warheads. In this way, 24*8=192, and "typhoon" level is 20*10=200.When nuclear submarines launch strategic nuclear missiles underwater, they are subject to complex forces, including seawater pressure, seawater disturbance to submarines and missiles, gas and engine thrust, etc. Therefore, the launch depth is relatively limited, generally 30-60 meters underwater (in special circumstances) It can be launched under 70-100 meters, but the launching device has been greatly changed, generally no more than 50-60 meters, too shallow and easy to be exposed, too deep and large resistance, affecting the launch accuracy, etc.), the speed of launch cannot exceed 5-- At knot 6, the waves cannot exceed level 5, otherwise it will seriously affect the launch safety and the accuracy of missile hits. Most nuclear missiles also have self-destruct devices. In the event of an accident, nuclear missiles can self-destruct. In nuclear explosions, the equivalent is about 0.1 megaton TNT (100,000 tons, 1 megaton = 1,000,000 tons), so the "Typhoon" class has the upper hand in the destructive power of a single ship. The biggest advancement between the P-39 and the previous Soviet missiles is that the "Trident" uses three-stage propulsion and solid fuel. In this way, there is no gap between launch preparation and range, and because the "Typhoon" class can fire two missiles in a row, the time it takes to launch all missiles is undoubtedly an advantage in the "Typhoon" class.

However, because the Soviet Union's solid-fuel ballistic missile technology is not as mature as the United States, there is still a lot of gap between the P-39 missile and the Trident missile. First, the launch weight of the P-39 is 90 tons, while the Trident II is only less than 60 tons, which caused problems such as increased recoil after launch. Secondly, in terms of accuracy, the circular probability error of the P-39 equipped with the "Starlight" astronomical guidance system is 500 to 600 meters, while the trident type is only 380 to 420 meters. Although the maintenance cost and manufacturing cost of the P-39 is not comparable to that of the Trident missile, therefore, it cannot be inferior.

torpedo

The Typhoon-class nuclear submarine has 6 533 mm torpedo tubes and fast loading devices, which can be equipped with 22 torpedoes, including EST-53-65K, СЭТ-65 and САЭТ-60M and "waterfall" rocket torpedoes, and can also be replaced with mines.

In order to guard against low-altitude aircraft and helicopters, it is equipped with 8 "needle" air-to-air missiles, which can only be launched on the surface. In fact, this is not important, but there are reports in the West that Russia has designed self-defense air-to-air missiles for the "Typhoon" class and other new ballistic missile nuclear submarines that can be launched from underwater.

Nuclear submarines in the world can be divided into different tasks and weapons and equipment:
Attack type nuclear submarine (it is a nuclear submarine with torpedo as its main weapon, used to attack enemy surface ships and underwater submarines)
Ballistic missile nuclear submarine (using ballistic missiles as the main weapon, but also equipped with torpedoes for self-defense, used to attack strategic targets)
Cruise missile nuclear submarine (using cruise missiles as the main weapon, used for campaigns and tactical attacks)
The performance of active strategic bombers [Strategic Bomber (Strategic Bomber) is a type of bomber, a large military aircraft that drops bombs from a high altitude to the ground. Unlike tactical bombers, which are used to bomb troops and military equipment in a certain combat zone, strategic bombers are used to perform long-range bombing and strategic bombing, carrying long-range, high-power air-to-ground missiles or nuclear weapons against the enemy’ s heart. Regional strategic targets such as major military installations, factories, and cities are attacked, and the enemy's warfare capabilities are greatly weakened in one fell swoop. , Dubbed "football" by the Americans, its role is to ensure that the president can command nuclear attack forces anytime and anywhere.

There are 4 kinds of important documents in the black leather bag. The first is the Black Handbook, which lists four action plans with different strike strengths, recording the number of nuclear missiles in the United States, deployment locations and planned launch routes, etc.; the second is a list of classified bases, which records secrets that can be used by the President in an emergency. The list of bases; the third is the emergency broadcast procedure, which records the president's broadcast to the country after the bombing; the fourth is the certification card with the presidential certification number on it. If the card is not confirmed, any order issued in the name of the president will be invalid. Of course, all nuclear-weapon states in the world have very strict procedures and regulations for the management and use of nuclear bombs. In addition, in order to prevent misoperation, viruses, hackers and other intrusions and other accidents, there are many automatic error prevention systems to ensure safety, for example, to prevent misoperations, automatic lockout systems, accidental termination systems and other fully automated security system settings. Nuclear submarines have more procedures for launching nuclear missiles, and the steps and procedures are strict. Finally, they reach the submarine commander. At the same time, multiple people start a common procedure, and they can only launch after they are approved.
Of course, strategic bombers can also be used for tactical bombing.
The definition of a modern strategic bomber, based on the Soviet-U.S. "Phase I Treaty on Reduction of Offensive Weapons" signed on June 1, 1990, is considered a "strategic bomber" if one of the following two conditions is met:

The voyage is greater than 8000 kilometers. For air-launched missiles, range refers to the maximum arc length of the surface that can be reached under the standard design mode of flight until the fuel runs out. For ballistic missiles, the range is the arc length projected on the surface by the flight trajectory between the launch point and the reentry point. For an aircraft, the range is the maximum distance that can be flown in the most economical mode without air refueling with 7500 kg of ordnance. After landing, the internal fuel is less than 5% of the maximum capacity of the fuel tank. The most notable feature of the Tu-160 bomber is the Tu-160 design that uses a wing-body fusion body for aerial refueling. The wing is a variable swept wing; it is equipped with 4 afterburner turbofan engines, which are installed in pairs under the wing and close to the aircraft. The two engine nacelles at the center of gravity; the cross-shaped tail fin; and the weapon compartment in the middle of the fuselage. The overall aerodynamic layout of the Tu-160 is very similar to that of the B-1B. The similar overall layout shows that the designers of the two countries want to use the same method to solve a common problem, namely, the characteristics of long range, long endurance and large weapon load of the bomber and the penetration capability of low altitude high subsonic speed and high altitude hypersonic speed. Combined. From FB-111, "Backfire" to B-1B and Tu-160, variable sweep wing layout has become the only way to solve this problem. However, Tu-160 and B-1B are quite different.

Tu-160 is approximately 20% larger than B-1B. Its wingspan is 55.75 meters, 33.53 meters, length 53.95 meters, height 13.72 meters, and wing area of 370 square meters; while B-1B wingspan is 1.67 meters, 23.84 meters, length 44.81 meters, height 10.36 meters, and wing area 181.2 Square meters. The plane shape of the Tu-160 plane is quite different from that of the B-1B, and is similar to the "Backfire" bomber. In addition, the increased thickness of the wing root provides sufficient space for the 6-wheel main landing gear to be stowed. The tires move backwards and upwards into the fuselage. It can be seen from the wing roots of the "Jolly Roger" that the structural butt joints near the front edge of the wing roots. This shows that the aircraft of the Tu-160 is integrated with the fuselage through the rectifying edge strips, instead of designing the wing body as a whole structure like the B-1B. Tu-160 has two weapon bays, both of which can accommodate a rotating launcher capable of launching 6 AS.15 "pole" subsonic air-launched cruise missiles.-160 section view can also carry cruise missiles, short-range attack missiles, nuclear bombs, Various weapons such as conventional bombs and torpedoes. In addition, the pylons can also be replaced with conventional pylons that carry conventional bombs U-160.

It is equipped with a "long-range air-launched nuclear warhead cruise missile." Among them, the range is the range of the previous air-launched missile, and it reaches 600 kilometers.

Accordingly, the 5 series of bombers are called strategic bombers:

Ÿ United States: B-1B, B-2A, B-52G/H

Ÿ Former Soviet Union: Tu-95 series, Tu-160, etc.

For the Tu-16 and Tu-22M3 series, which can carry 600 kg nuclear warhead anti-ship missiles, stop using and destroy nuclear weapons and are not classified as strategic bombers. B-1B also dismantled the AGM-86B missile launcher in accordance with the treaty and was no longer included in the strategic bomber team. Stealth technology is used in all stages of design to effectively control and reduce the target

characteristics of the aircraft.-Shape design-Material selection-Structural design-System design and equipment selection.

While military satellites have brought great convenience to one's own military operations, they also made the other side see its huge potential threats. Therefore, since the 1960s, military powers such as the United States and the Soviet Union have been committed to the development of anti-satellite weapons such as "anti-satellite", "anti-satellite with satellite" and "anti-satellite with energy" and used them as control Space, important weapons and equipment to seize the power of heaven. There are various types of anti-satellite weapons, but from the perspective of their killing mechanism, the anti-satellite weapons that have been developed and are currently being developed are mainly divided into five types:

Nuclear missile

The use of nuclear warheads to explode near the target spacecraft to produce strong thermal radiation, nuclear radiation and electromagnetic pulse effects, destroying the structural components and electronic equipment of the spacecraft, or making it incapacitated. It has a long range and a large kill radius, and it can still destroy the target even when the weapon's own guidance accuracy is poor. However, the shortcomings of nuclear missile anti-satellite weapons are low accuracy and large additional destructive effects, which are likely to pose a threat to one's own satellites, and once used, they may cause a nuclear war.

The Tu-160 has two weapon bays, both of which can accommodate a section view of the -160 that can launch 6 AS.15 "pole" subsonic air-launched cruise missiles. It can also carry cruise missiles, short-range attack missiles, nuclear bombs, and conventional bombs. Various weapons such as torpedoes. In addition, you can also replace the conventional rack with the rack 60.

The nuclear bomb-grade power supply is a miniaturized tactical nuclear weapon. It is a nuclear fusion weapon. It uses two 470 μ F, 200V voltage-resistant capacitors as explosives. Compared with the general hydrogen bomb, the atomic bomb neutron source is greatly reduced in volume, and thermonuclear Fusion has no critical mass limit, which makes the entire power supply very small and light. The general standard is only the size of an ITX power supply, but the explosive equivalent can reach trillions of tons, which can easily kill tens of millions of people in any super city. It is said that it was originally developed by Nvidia. AMD has always suspected that terrorists possess this so-called power nuclear bomb. 1.Sarmat

RS-28 ballistic missile, nicknamed Satan-2, is Russia's latest intercontinental strategic ballistic missile. It is the next successor to the "Satan" intercontinental missile that provides endless terror and deterrence to Europe, America and the world. It is the world's most powerful, longest-range, and strongest intercontinental ballistic missile. It can carry quite a few nuclear warheads and has a huge yield. According to different launch targets, different amounts of fuel can be loaded. One has a range of 16,000 kilometers, and the largest may even reach nearly 20,000 kilometers. At this time, its take-off weight is about 100 tons, and the bomb load is about 8 tons.

2. Dongfeng-41 ballistic missile

The Dongfeng-41 ballistic missile is a land-based intercontinental ballistic missile equipped by the Rocket Force of the Chinese People's Liberation Army. It is a development and improvement of the Dongfeng-31 ballistic missile. The Dongfeng-41 ballistic missile uses a three-stage solid fuel rocket as its power, with a maximum range of about 1,2000-14,000 kilometers. Its tractor can be maneuvered on roads and has certain off-road performance. The missile also uses computer-controlled inertial guidance. The system improves the hit accuracy. The missile can carry 10 sub-guided penetration nuclear warheads and can eliminate 10 strategic US targets at a time. It can be said to be one of the strongest intercontinental ballistic missiles today.

3. Trident 2 submarine-launched missile

UGM-133A ballistic missile, translation: Trident II, also known as the Trident D5 missile, is the third-generation submarine ballistic missile of the US Navy and the most important sea-based nuclear deterrent force of the US Navy. This type of missile was first deployed in March 1990. With its strong scientific and technological strength and industrial foundation, the UGM-133A ballistic missile is still the well-deserved king of submarine-launched ballistic missiles. The Trident 2 missile is one of the most accurate submarine-launched intercontinental missiles in the world. The missile weighs 59 tons and has a range of 12,000 kilometers.

Kinetic energy anti-satellite weapons rely on the momentum of high-speed moving objects to destroy the target, usually using rocket propulsion to increase the warhead to a high speed, and make it directly collide with the target spacecraft to destroy it. At the same time, the high-energy explosive blasting device carried by the warhead can explode near the target, producing dense metal fragments or shotguns to destroy the target. Anti-satellite weapons using this method of killing require highly sophisticated guidance technology. For example, the anti-satellite missile launched by the F-15 aircraft developed by the United States can directly hit the target.

Directed energy anti-satellite weapons emit high-energy laser beams, particle beams, and microwave beams to directly irradiate and destroy targets. The weapons that use these types of beams are usually called high-energy laser weapons, particle beam weapons, and microwave weapons. Using directional energy to destroy space targets has the advantages of repeated use, fast speed, and wide attack area, but it is technically difficult and vulnerable to weather, and the effect of destroying targets is difficult to evaluate.

An anti-satellite satellite is a satellite with a blasting device. It uses its own radar infrared to detect and track the target in the same orbit as the target satellite, and then approaches the target satellite within tens of meters, and will carry The satellite warhead of high-energy explosives detonated, producing a large amount of debris and destroying the target. Currently, the US Army and Air Force are stepping up the development of anti-satellite weapons.

The average service time of the US "Ohio" class strategic nuclear submarines in active service is estimated to be 44 years. Therefore, by the 2020s, the US Navy does not need to replace this class of ships. Among them, the four modified "Ohio" class are expected to serve until 2027 to 2028. By the time of I/2008, the "Ohio" will be re-commissioned as the first cruise missile nuclear submarine, 22 of the 24 missile launching tubes on the boat will be changed to be capable of carrying 7 tactical "tomahawks" each The missile’s launch tube and the other two are used as 9-person lock chambers for 66 (can be increased to 102 in an emergency) for the entry and exit of the submarine. In addition, a dry deck transport device or advanced "sea leopard" unit can be carried on the deck to transport the submarine. The 4 modified "Ohio"-class nuclear submarines will replace nuclear reactors with new nuclear fuel, equipped with the latest sensors and communication systems. In addition to the four nuclear submarines that are expected to be converted into cruise missiles, the remaining 14 "Alaska" in the "Ohio" class were completed in February 2002 and equipped with the "Trident" D-5 ballistic missile.

The total number of attack nuclear submarines in service in the United States in 2002 was 53. When the first "Virginia" class was ordered in 1998, the construction cost was US$4.2 billion. By the beginning of 2002, its construction cost had increased by US$341 million. This limits the speed of ordering one ship per year. If the construction of the "Virginia" class is completed as planned, the United States will end up with only about 30 attack nuclear submarines.

The first boat of the "Virginia" class was completed and commissioned in June 2004, and the fourth "North Carolina" of the class will be completed and commissioned by the end of 2007. However, its fifth ship will not join active service before 2010 and thereafter. It is possible to continue building the "Virginia" class nuclear submarine at the rate of one per year.

In 2004, the third and last ship of the "Seawolf" class, the "Jimmy Carter", will enter service. Although the "Sea Wolf" and "Connecticut" nuclear submarines with an underwater displacement of 9,137 tons are used as attack nuclear submarines by the US Navy, the "Jimmy Carter" is slightly different from the previous two.

There are only 12 Russian strategic nuclear submarines in existence, including 1 "Typhoon" class, 6 "D-lV" class and 5 "D-m" class. The last ship of "D-Ⅲ" class will be launched in 2005. Retire at the end of the year. After major repairs in the late 1990s, the first "Typhoon" class boat was named "Dmitry Donskoy" in October 2000.

Since the 1960s, the United States and the Soviet Union have been competing for hegemony in space for decades, gradually expanding the land, sea and air battlefields into outer space, which has caused major changes in the "time and space view" of war. Since military activities on the space battlefield are not affected by factors such as the earth, national borders, weather, etc., both parties in combat can take a full range of combat operations within the scope of orbital maneuverability, which enables combat in a real sense of flexibility. And coordination. For example, Star Wars, Space War, etc.

Especially in the future information warfare, various reconnaissance, early warning, and communication satellites located on the space battlefield will be the core components of the military command automation system and become the first target of the opponent's attack. In order to gain the initiative on the three-

dimensional battlefield of land, sea and air, the two sides of the war must first seize the "commanding height" of the space battlefield.

Famous wars in world history, such as

Blitzing Poland, the air battle of Great Britain, the defense of Stalingrad, the Japanese attack on Pearl Harbor, Fˆ˜&ie=utf-8&src=internal_wenda_recommend_textn" the battle of Midway Island, the landing of Normandy, etc.

Some military powers in the world, in order to meet the needs of their political, economic and military interests, will never give up their fight for the space battlefield. In particular, as high and new technologies are widely used in the military field, the military has increased its troops in space and its ability to compete for space has greatly improved. It is no longer difficult to conduct space operations. Therefore, the future competition in the space battlefield will break through the past purely technical weapons contests, and focus on the use of space forces, using space raids, space assaults, and space blockades to conduct military operations in the vast outer space. Big contest. At that time, an unprecedented space war will appear on the stage of world war with a brand new look.

The characteristics of the space battlefield are the starting point and goal of studying air-space warfare, and the objective and theoretical basis for developing aerospace weapons, formulating aerospace strategies, and forming aerospace forces. This is one of the important issues in the revolution of military theory in this century and the world's scientific and technological revolution.

United States, Russia, United Kingdom, France, China, India

The United States regardless of quantity and quality. Strategic nuclear submarine Ohio class, attack submarine Los Angeles class, Seawolf class, Virginia class

Russian strategic nuclear submarine DIV class, Typhoon class, North Wind God class, attack nuclear submarine Akula class, Oscar class, Yasen class.

British strategic nuclear submarine avant-garde class, attack nuclear submarine fast class, agile class

France Strategic nuclear submarine Triumph class, attack nuclear submarine Ruby class, Barracuda class

China Strategic nuclear submarines 092 (Xia class), 094 (Jin class), attack nuclear submarines 091 (Han class), 093 (commercial class), etc.

Sino-Japanese Sino-Japanese War

Battle of Ingama Island

Battle of Midway

Coral Sea Battle

Battle of Jutland

Battle of Helgoland Bay

Battle of the Falkland Islands

Sinop Battle

Ushakov's expedition to the Mediterranean

Battle of Vyborg

Battle of Trafalgar

Battle of Lowestoft

Battle of Navarino

Battle of Lisa

Kaliaklia, pta.
Battle of Cape Hanko
Battle of Gogran
Battle of Tsushima
Battle of Athos
Battle of Abukir
Luliang naval battle
Battle of Economus Cape
Sign space-based surveillance satellites and set up a space attack team. At the beginning of the 21st century, the US military also conducted space warfare exercises in Colorado with the background of 2017.

The space force is assigned the task of launching various military spacecraft and attacking enemy space weapon systems. The Russian military has also included space combat operations into the scope of modern campaigns, and clearly divided space into two theaters, a near-Earth space theater and a lunar space theater.
Japan has also stepped up the research and development of spacecraft and formulated a small satellite development strategy to enable spacecraft to develop in the direction of high performance, long life, multi-function and networking.
India began to develop low-orbit surveillance satellites that can monitor missile launches in 1999, and is preparing to develop small space shuttles that can be reused hundreds of times and enter orbit in a single stage.

US strategic nuclear submarines are active in the Atlantic and Pacific oceans all year round. Russia, the United Kingdom, and France also have strategic missile and nuclear submarines on duty for combat readiness. In December 1985, the K-431 nuclear submarine was on its way back to Vladivostok (Vladivostok) base. Due to the leakage of the primary circuit of the Type 675 Echo-II submarine, the submarine immediately rose to the surface. The leakage caused a decrease in the quality of the coolant in the primary circuit, and all personnel began to divert water from the submarine's fresh water tank. The reactor shut down immediately. The leak caused the polluted water to flow into the sea, so the radiation level could not be determined. In the area around the submarine, people soon discovered a leak of radioactive iodine. The crew tried to stop the leakage of the cooling system pipes. How long it will take to shut down the coolant supply is still unknown. Due to the loss of coolant, the temperature of the reactor rose, so the alarm went off. The coolant supply was immediately switched on again, but it was too late. The re-supply of coolant caused the fuel assembly to rupture due to the high temperature, and the water flowed in to contact the uranium fuel. The heavily polluted water was discharged to the Amur, causing the breakdown of the processing equipment. At the base, the radioactivity of the contaminated coolant was determined to be 0.3 Curie/l, for a total of 74 Mbeck and 2000 Curie. The submarine's staff received a

radiation level of up to 40 mSv (4 roentgen). In the unfathomable underwater world, submarines not only have to endure tremendous pressure, but also bear greater and more risks than surface ships. According to statistics, about 170 major submarine accidents have occurred since the advent of the submarine. A major accident on a submarine will cause deaths or injuries, or the entire boat will die, and the submarine will sink. The command module is the heart of the submarine. It is mainly composed of officers, including the captain, who work here. There are usually a dozen people, all technical positions, mainly for driving, information collection (sonar, radar, etc.), and issuing combat orders.

When a nuclear submarine navigates under the sea, the main basis is the chart. Generally, all the seabed topography on the earth: trenches, mountains, basins, cliffs, rifts, etc., have precise marks on the chart. Just follow the chart to navigate. Up. Generally, sonar scanning is not used, because using sonar scanning will expose your position.

The main working systems of nuclear submarines include:

1. Reactor system. This system is the heart of the entire nuclear submarine and the power source of the entire boat. The main equipment includes: reactor, main circulating pump, related pipelines, equipment, various control and measuring instruments, etc.
2. Two-circuit system. The system is mainly responsible for converting the thermal energy generated by the nuclear reaction into mechanical energy, which is used to drive the steam turbine to generate electricity and drive the propeller to rotate. The main equipment includes steam generator, steam turbine generator set, main steam turbine unit, feed water pump, sea water pump, shaft system, sea water desalination machine, related steam pipelines and valves.
3. Electrical system. This system is mainly responsible for the power supply of all electrical equipment of the whole boat. The main equipment includes steam turbine generator sets, main converter sets, diesel generator sets, batteries, switchboards, various motors, cables and related instruments. Arrangement of important electromechanical equipment.
4. The cabin system. The main functions are fire extinguishing, main water tank injection and drainage, hydraulic supply, domestic garbage disposal, etc. The main equipment includes high-pressure gas station, hydraulic station, toilet, fire-extinguishing device, various water tanks, etc.
5. Air conditioning system. The main function is to electrolyze water to produce oxygen, purify air, and cool the air of the entire boat. The main equipment includes refrigeration units, oxygen generators, air purification devices, ship-wide ventilation devices and related pipes and meters. 6. Launch system, weapon system 7. Other systems 8. High-tech equipment of modern nuclear submarine, emergency escape system, etc.

Generally speaking, no matter how many ships of a class are built, the main equipment of the electromechanical system is the same. The main difference is the upper equipment such as Wubeiguantong. This is the case for merchant ships and aircraft carriers. Of course, nuclear submarines are no exception. To improve the communication system, just replace the antenna, transmitter, etc. and rewrite the program. The volume and weight of the equipment are generally small. If the main steam turbine is to be replaced, it is a big project. First, the hull must be cut open. If the reactor has a major

problem, the boat should be decommissioned. Therefore, the initial design of the nuclear submarine is mainly the design of the electromechanical system and the installation of the main equipment. The manufacturing is also the most troublesome. There are usually many faults and it is difficult to completely eliminate it.

1. Regarding the degree of automation, most people think that a submarine with good performance must have a high degree of automation, and thus the combat effectiveness is also strong, but it is not. First of all, the term "automation" itself is a concept with vague connotation and unclear extension. In the design of nuclear submarines, most of the equipment has the function of switching between "automatic" working conditions and "manual" working conditions (some important equipment also has "model control" and "numerical control" in the "automatic" category), and all of them are "automatic" ", its degree of automation is high, all cast "manual", its degree of automation is low, 091 is like this, so is "Sea Wolf". As for the relationship between the number of people and automation, it is even more difficult to say. "Seawolf" is recognized as the most excellent nuclear submarine today, but its number is 133, more than 091. It can be seen that in terms of the degree of automation, 091 and "Sea Wolf" are at the same level. Regarding the impact of automation on combat effectiveness, it is also difficult to give a quantitative assessment. It can only be said that a high degree of automation can improve the smoothness and safety of equipment operation and reduce personnel fatigue. However, well-trained crews can also accurately complete various actions under "manual" conditions. In addition, all nuclear submarines must meet the three-level staffing system. Under normal circumstances, 7-9 hours of sleep can be guaranteed. , The fatigue problem is not obvious.

2. The issue of diving depth is also a hot topic. It is said that the "Serra" class can dive to 1000 meters, reaching the diving limit. Generally speaking, 600 meters to 800 meters is the best, and super large nuclear submarines are above 1000 meters.

3. Quietness is an important index for evaluating submarine performance.

What factors determine the quietness index of a submarine? The key is "details"-the level of manufacturing and assembly, which is mainly reflected in the rotating mechanism-such as shafts, gears and mutual cooperation-not only longer life, but also less noise; large The installation of equipment-such as the connection between the main steam turbine and the hull-is more scientific and has less vibration. These seem insignificant, but they are the greatest advantage of nuclear submarines-a great hazard to stealth. At the same time, they also affect the detection range and accuracy of their own sonar. From 1959 to 1967, there were 12 Type 627A torpedo nuclear submarines, 8 Type 658 ballistic missile nuclear submarines, 5 Type 659 cruise missile nuclear submarines and 29 Type 675 cruise missile nuclear submarines (known as "Echo" Class II by NATO). The 658, 659 and 675 boats were all designed by the 18th Central Design Bureau. The first-generation nuclear submarines of the Soviet Union all adopted a double-hull structure and had a large reserve buoyancy. They all used a dual-axis nuclear power plant including two BM-A reactors. The level of manufacturing and assembly is the highest in a country’s overall industrial and scientific research capabilities. An important manifestation is that the impact on a country is far greater than that of the IT industry, which is why India’s software industry is much stronger than Russia but it cannot be called an industrial power. The technological level and scientific research strength of the US manufacturing industry far exceeds that of China, and its nuclear submarines should be more quiet than China.

4. Offensive and defensive capabilities of nuclear submarine combat power

(1) Navigate underwater for a long time, undulating freely within the allowable depth;

(2) The first enemy finds it and can make a hit if necessary.

Article (1) is the requirement of concealment-underwater is the safest, and Article (2) is for destroying the enemy. It is easy to understand that Article (1) is the basis of Article (2) and should be more It is more important, mainly because it is generally believed that in the confrontation between submarines and anti-submarine forces (including submarine anti-submarine forces), the submarine has the upper hand before being discovered, and once discovered, the anti-submarine forces have the upper hand. Therefore, submarines must be ubiquitous and never be discovered. The popular point is to let the enemy know that there are submarines in this sea area, but they are always unable to find them. This puts the enemy in a state of high tension. Most of its sea power is used for Anti-submarine warfare may not dare to enter the disputed sea area rashly, thus losing the best combat opportunity or unable to support land forces or attacking land targets, thus affecting the course and outcome of the entire war. Therefore, in wartime, even a submarine with ordinary performance, as long as it can hide and hide underwater, its role should not be underestimated.

Nuclear submarines are different from conventional submarines. To achieve Article (1), a submarine must first do the following two things:

a. The sub-systems of the electromechanical system can maintain normal operation for a long time;

b. In the case of minor damage, it can be suppressed and eliminated in the shortest time. When a severe degree of damage occurs, the submarine and its most important equipment should be kept above the bottom line of safety. Neither the tragedy of sinking or death of the boat will occur, and the nuclear submarine must also ensure The safety of the reactor.

(1) A nuclear submarine relies on an oxygen generator to electrolyze water to produce oxygen for people to breathe when underwater. The water needed for electrolysis is made by desalinating seawater by a desalinator. The working principle of the desalination machine is to relied on steam to heat seawater to produce distilled water. The failure of any link in the functional system of steam system-desalination machine-oxygen generator will affect the production of oxygen;

(2) The rotation of the submarine's elevator is usually driven by the motor. If the motor fails or the switchboard where the motor is located catches fire and burns, the submarine will not be able to deepen underwater;

(3) As long as the destroyer catches fire, as long as the ammunition compartment is not detonated, the worst case is that all personnel are evacuated to the upper deck and sea water is introduced into the compartment. And if there is a fire in the submarine, a small fire can be said to be good. The big fire can consume the oxygen in the cabin within a few minutes, and the harmful gas produced is even dinosaurs unbearable. Due to the large number of steam pipes in the nuclear submarine, if the fire causes the refrigerating machine to stop, the cabin temperature can rise to more than 70 degrees within a few minutes. If the reactor stops, the situation will be more serious, and even explosion or other terrible consequences will occur;

The above is only a small part of the many factors affecting Article (1). The actual situation is far more complicated than imagined.

5. In terms of tactical use, submarine tactics seem to have not changed much in decades. There are few nuclear submarine battles. Only the nuclear submarine "Conqueror" of the Royal Navy sank the "General Belgrano" of the Argentine Navy during the Anglo-Amara War. cruiser. So that the enemy can never be sure whether there is nuclear submarine activity in the sea area, or do not know where it is.
6. The quality of personnel is an important part of combat effectiveness and an important factor influencing the extent of equipment performance.
Conventional submarine and nuclear submarine

Only in terms of technical content and manufacturing difficulty, the two are not in the same order of magnitude. As mentioned earlier, observation systems, communication systems, navigation systems, weapon systems, and electromechanical systems are the five major components of a submarine. The other four systems are similar. The main difference between the two is the electromechanical system. As mentioned earlier, the electromechanical systems of nuclear submarines are divided into reactor systems, secondary circuit systems, electrical systems, compartment systems, and air conditioning systems. Conventional submarines do not have a reactor system and a secondary circuit system, and the power system does not have a steam turbine generator, and the switchboard and electrical equipment are much less. However, diesel generator sets have more power than nuclear submarines and have much more batteries.Compared with the unpowered method, the tail of the powered launch vehicle is equipped with a rocket engine, underwater control rudder and related control equipment. After launching through the torpedo tube, it first enters the unpowered control section. After the vehicle is 10 meters away from the submarine, the rocket engine at the tail of the vehicle ignites and accelerates the vehicle to a speed of 20 meters per second. After 10-15 seconds, The vehicle exits the water at a 45-degree angle to the sea level and jumps into the air, and its exit height can reach more than 20 meters.

At this time, through the thrust of the gas generator in the carrier, a piston ejects the missile from the carrier, the anti-ship missile booster is ignited, and the missile enters the air flight state. These two launch methods have their own design difficulties and combat advantages. When using the unpowered launching method, in order to reduce the underwater speed loss of the launching vehicle and ensure the requirements of its exit speed, the submarine can only use the periscope for deep launch, which is less concealed, while the powered launching method is This shortcoming does not exist, so the missile can be launched within the full combat depth of the submarine, and the concealment is higher.

In addition, since the safety of the reactor must be ensured while the safety of the boat is guaranteed, radiation protection is also a factor to be considered. Therefore, the reliability index of the equipment used in the electromechanical system of nuclear submarines is usually the highest among similar products, and important equipment must be used. Redundant design. After the nuclear test in May 1998, India became a nuclear country, with the "Earth" and "Agni" nuclear missiles as its main nuclear force. In January 2003, India established the Nuclear Authority Policy Committee, which is composed of the Prime Minister, the Minister of Internal Affairs, Foreign Affairs, Finance and Defense, and National Security Advisors. It has independent power to order the launch of nuclear missiles and is responsible for the command and control of nuclear forces.

At present, it is the prime minister who has the right to activate the "nuclear button" in India.In the 1980s, the completion of six Type 941 "Shark" class (also known as "Typhoon" class) ballistic missile nuclear submarines can be regarded as the last decisive success in the Soviet nuclear submarine manufacturing industry. In order to ensure that the Д-19 missile launch system and 20 Р-39 solid-fuel submarine-launched ballistic missiles with a launch weight of more than 90 tons can be deployed on the boat, the "Ruby" Design Bureau adopted an original double-body layout with a symmetrical arrangement of the double solid shells. , The missile silo is arranged between the two solid shells, with a full load displacement of 48,000 tons. In order to make this giant underwater speed reach 28 knots, the most powerful ОК-650 dual-shaft nuclear power plant ever used on a submarine is used. It consists of 2 ВМ-5 pressurized water reactors with a total thermal power. 380 megawatts. Of course, this is not the main issue. The key difference lies in the reactor. A conventional submarine is essentially a diesel-powered destroyer that can dive. Nuclear submarines are different. There are few countries in the world that can produce reactors. It is even more difficult to miniaturize the reactors and install them on ships. Only five major countries have successfully built nuclear submarines. Japan and Germany have built nuclear-powered cargo ships. It is generally believed that Japan is capable of building nuclear submarines, and it is likely to be building a land-based test reactor for submarine reactors.

For example, the unit price of the "Sea Wolf" is US$2.4 billion, which is equivalent to 10 "Kilo". The strategic nuclear submarine carries strategic missiles and warheads, and the price has to be more than doubled. This is only the purchase cost, its maintenance and supporting facilities. The cost of facility construction is several times this. The sinking of a nuclear submarine is economically equivalent to the loss of a dozen conventional submarines. If it is a strategic nuclear submarine, it will directly affect the foundation of national security.

Nuclear submarine is so complicated and expensive, and its combat power is unparalleled. Today’s conventional submarines in service and under development, whether they use "Stirling" engines, fuel cells, or self-closing cycle diesel engines, their longest underwater residence time is less than one week. This is still an ideal situation. High speed, such as getting rid of anti-submarine aircraft search, and being able to stay underwater for three or four days is considered great. As long as the nuclear submarine is not due to mechanical equipment, it can continue to sail underwater at high speed for one month, and the maximum underwater detention time is three months or longer. The strategic positioning of nuclear submarines is difficult to replace.

Therefore, as far as single boats are concerned, nuclear submarines surpass conventional boats.

Russian nuclear submarines (attack type) are generally divided into 7 compartments in terms of compartment division:

1. The cabin, also known as the torpedo cabin, is equipped with torpedo (missile) launching tubes, and is a cabin for storing and launching various weapons (torpedoes, missiles);

2. The cabin, also known as the command cabin, is the command center of the whole boat, equipped with observation, communication, navigation equipment and accommodation, and the cabin is equipped with battery packs and escape equipment.

The third cabin, also known as the front auxiliary engine room, is equipped with a main converter unit, a DC power station, an oxygen generator, and a diesel generator set is installed in the bilge;
4. Cabin, also called reactor cabin, in which the reactor and its auxiliary system pipelines and steam generators are installed;
5. Cabin, also known as the rear auxiliary engine room, the main equipment includes nuclear power plant (reactor, secondary circuit, electrical) main control center, AC power station, steam turbine generator set, refrigeration unit, desalination machine, feed water pump, etc.;
6. Cabin, also known as the main engine room, is the main engine equipment, the main equipment includes the main steam turbine unit, refrigeration unit, etc.;
7. Cabin, also known as steering gear cabin, the main equipment includes steering gear control device, emergency propulsion motor, main and auxiliary clutches, etc.
In addition, the whole boat is equipped with high-pressure gas cylinders, and steam pipes are led out from the stack cabin, passing through cabin V to cabin VI. Above cabin II, there is a bridge to accommodate various lifting devices (radar antennas, communication antennas, etc.). All are equipped with switchboards and ventilators, and air-conditioning, hydraulic and high-pressure gas pipelines run from the bow to the stern.
The structure of a conventional submarine is much simpler than that of a conventional submarine. There are only 5 cabins, of which the first three cabins are basically the same, but the diesel generator set alone occupies the IV cabin, which is similar to the nuclear submarine's VII cabin. The same is true for Western nuclear submarines and conventional submarines. Basically, the weapon bay is in the front, the command bay and the power bay are in the middle, and finally the steering engine bay.

(1) Oxygen production device, electrolyzed water to produce oxygen consumes a lot of electricity. Conventional submarines generally do not have this device, and they mainly rely on chemical reaction to produce oxygen. However, there are many nuclear submarines (generally more than twice as many as conventional boats), and it is common to sail for one month at a time (conventional boats generally do not exceed 15 days), and chemicals are not enough to maintain. A large amount of hydrogen is produced during oxygen production, which makes the oxygen production device very unsafe, and there are a large number of high-temperature steam pipes in the rear auxiliary engine room, so it can only be installed in the first 3 cabins or the steering engine room. Make major changes.
(2) The refrigeration unit is also a high-power electrical appliance. Conventional boats generally do not have or have low power. There are many steam pipes in nuclear submarines. The reactor compartment also needs cooling. Although it can be installed in the rear auxiliary engine room, its cooling water pipes But it has to run through the entire boat, and modification is also quite troublesome.
(3) There are generally two main converter units, conventional submarines, but nuclear submarines have high reliability requirements, generally more than three, and their size is quite large. If installed in the rear auxiliary engine room, it will make the already small space more crowded, and installation in the original cabin will also require great changes to the structure.
(4) Others such as ventilation, air conditioning, hydraulics, etc.
(5) Weapons, missiles, fish, etc.

(6) Emergency escape and self-rescue system This is the most important escape system for modern nuclear submarines, especially large strategic nuclear submarines and tactical nuclear submarines.

There are four main ways of escape: 1: Quick floating escape method, wearing a quick-floating suit, enter the escape cabin (escape tower) one by one, quickly float to the surface, and contact the rescue vessel on the water. 2: It is a decompression escape method, that is, the crew wears out the boat equipment, goes out of the boat through the position of the boat, and decompresses and rises station by station along the buoy line according to the regulations, and then surface. :3:: Use a "torpedo launcher" to "launch" a person to a safe place, but due to the high speed, it may damage the eardrum of a person. 4. Large nuclear submarines are equipped with escape devices and special equipment, miniature submersibles, special pressure-resistant diving suits, diving life protection cabins, etc. The fourth is the most important safety protection focus of modern nuclear submarines, and it is also one of the difficulties in the research and manufacture of nuclear submarines.

On May 23, 1939, the U.S. Navy's S-192 Dogfish submarine began a sea trial after an overhaul. As the snorkel baffle was not completely closed, sea water poured into the main engine compartment and 27 people were killed.

In April 1963, an American nuclear submarine "Thresher" sank in the waters near Cape Cod in the United States. 129 people were killed, making it the world's first nuclear submarine wrecked.

In 1967, the first generation attack nuclear submarine No. 105 of the British Belkin Hyde Shipyard sank in water.

In 1968, a US nuclear submarine "Scorpio" sank in the mid-Atlantic waters on its way to the Canary Islands, killing all 99 people on board.

In April 1968, an E-II-class missile nuclear submarine of the Soviet Union sank in the Mediterranean after mercury vapor poisoned all its crew members, killing 90 people.

On March 30, 1994, when the French Navy's "Emerald" nuclear-powered submarine was sailing in the Mediterranean waters, the turbo generator room of the rear compartment exploded and 10 people were killed.

On August 13, 2000, the Russian navy "Kursk" multi-purpose nuclear submarine sank while participating in an exercise of the Northern Fleet in the Barents Sea, killing all 118 people on board.

There are several reasons why submarines are exposed:

1. Sound characteristics

During the operation of the submarine, various power and living devices, especially the propeller cutting the water body, will generate a lot of noise. These noises are also called the background sound of the submarine. If the background sound is too large, the enemy anti-submarine ship only needs to turn on the

passive sonar. You can clearly determine your location and distance, which is the biggest cause of submarine exposure.

2. Thermal infrared characteristics

Regardless of whether it is a conventional submarine or a nuclear submarine, their power system will inevitably discharge some cooling water and domestic water during operation. When the conventional submarine is floating and charged, the diesel engine will even release high-temperature exhaust gas during operation. Although these exhaust gases will be cooled and discharged, the temperature is still significantly higher than the ambient temperature. After the hot water discharged by the submarine rises to the surface, it can form a high-temperature wake stream with a length of more than one kilometer and a duration of 5 to 6 hours. Modern anti-submarine aircraft are equipped with highly sensitive infrared detectors that can sense temperature changes of 0.001° C. Such high-temperature wakes can easily expose the whereabouts of the submarine.

3. Magnetic field characteristics

The pressure hulls of submarines are made of low-magnetic alloy steel coils, but due to the existence of the earth's magnetic field, the frictional magnetism between the hull and the propeller and the water flow will gradually increase the submarine's magnetic signal characteristics. Most of the new anti-submarine aircraft that appeared after the Cold War were equipped with frequent magnetic anomaly detection needles on the tail. These magnetic anomaly needles detect submarines through the principle of electromagnetic induction. After sensing the changes in the magnetic field through the sea, the magnetic needles will emit different intensities. The changing current, so as to know the existence of the submarine.

Behind the P3C anti-submarine aircraft is the magnetic needle detector

4. Radiated signal

During the operation of the nuclear submarine, the reactor will release cooling water, gas and trace radiation dust with radiation particles such as potassium-40 and chlorine-38. When these radiation particles rise to the surface of the sea, they will form a radiation characteristic significantly different from the surrounding seawater. The change in radiation characteristics is too small. Currently, there are no mature targeted methods.

Submarine nuclear reactor compartment

5. Biological field effect

When a submarine is sailing in the water, the electromagnetic waves emitted outward and the vortex formed by the propeller will stimulate some plankton and bacteria in the ocean with luminous ability to glow at the same time, which is called the submarine optical wake. Depending on the density of marine life, the light wake can reach hundreds or even thousands of meters, and usually lasts 15 to 30 minutes before disappearing. Theoretically, the existence of optical wakes can be detected by anti-submarine aircraft and satellites. However, since optical wakes are difficult to distinguish from biological self-luminescence and have a decisive duration, there is currently no submarine detection method for this aspect.

From the above analysis, we can see that although the submarine is underwater, it still exposes a lot of information. Among them, visible light signals, acoustic characteristics, electromagnetic characteristics, and infrared characteristics are the most easily known to the outside world, because sound is the only one. The medium that can propagate long distances underwater, reducing submarine noise is the most important and very important for improving the concealment of submarine.

Sonar is the most important anti-submarine detection equipment. The core of submarine response to anti-submarine is to reduce its own noise! The largest source of submarine noise is the power unit. During operation, it collides with the submarine shell and generates noise of more than 150 decibels. In order to overcome this huge noise source, vibration-damping floating raft technology is generally used to combine steam turbines and generators. , The transmission gearbox is installed on the shock-absorbing base made of rubber at the bottom, which can effectively buffer the huge noise generated by the hard metal contact, and the noise reduction effect can reach as much as 30 decibels.

Kilo-class submarine power plant shock-absorbing raft

In addition to the main power unit, propelling the propeller to cut the water body is also a major source of submarine noise. Due to the obvious sound characteristics of the propeller, it has also become the main recording object of the submarine's voiceprint. By monitoring the sound of the propeller, the enemy can learn from the voiceprint library. To accurately determine the submarine’s model and even its serial number, improving the propulsion device is also an inevitable requirement for noise reduction. Modern submarine propellers are mostly made of high-damping alloy materials and made of asymmetric multi-blade large-tilt design. High-damping materials can reduce blade vibration. The more blades, the lower the speed at the same propulsion speed, and the lower the speed is. To reduce cutting noise, the asymmetric large tilt design can reduce the generation of cavitation and prevent resonance to the maximum extent.

The Russian Lada-class submarine uses a seven-blade large inclined propeller

Of course, the best way to minimize noise in the power propulsion system is to use the power combination of electric drive plus pump jet propulsion. Because electric propulsion does not require complex energy conversion, there is no need to install sub-structures including reduction gears, transmission shafts, etc., which have great friction and sound. The United States is a nuclear power in the world today, with land-based (intercontinental ballistic missiles), sea-based (strategic nuclear submarines, submarine-launched ballistic missiles, and nuclear cruise missiles), and air-based (strategic bombers, airborne cruise missiles, and nuclear bombs). Strategic nuclear power, and the "Ohio" class ballistic missile nuclear submarine is the core of its sea-based nuclear power. Secondly, Russia, China, India, Britain and France

"Ohio" class ballistic missile nuclear submarine is known as the "king of contemporary submarines." In terms of overall performance, it is the most advanced strategic nuclear submarine in the world today. Russia's nuclear submarine is also very powerful, the new model of Russia's latest attack nuclear submarine "Yasen" class second ship "Kazan". The nuclear submarines of the United States and Russia occupy a leading position in the world, and it is difficult for other countries to compare and surpass them.

Currently, each "Ohio" class submarine has 24 "Trident" missile launchers, and each missile can carry 8 nuclear warheads. The United States has nearly 2,000 nuclear missiles that can be installed on 14 "Ohio" class submarines. "Trident" missiles are divided into two types: Type I and Type II. The Type I missile warhead is a Mk4 sub-guided warhead, each with 8 warheads of 100,000 tons equivalent, with a maximum range of 7,400 kilometers. The "Trident" II submarine-launched missile has a range of 11,300 kilometers. Each missile can carry 8-15 MK5 nuclear warheads with a power greater than 47.65 million tons, and can attack 8-15 different targets simultaneously.

The "Ohio" class nuclear submarine is an important part of the United States' strategic nuclear forces and one of the important guarantees of its nuclear deterrence strategy. The 24 missiles and 336 sub-warheads carried on an "Ohio"-class nuclear submarine can destroy 200-300 large and medium-sized cities or important strategic targets of the other party in half an hour.

According to relevant statistics, the US nuclear arsenal has obvious advantages in both quantity and quality: As of January 2005, it is estimated that the US has about 5,300 nuclear warheads, of which 4,530 are strategic nuclear warheads and 780 are non-strategic nuclear warheads.

In addition to having a strong sea-based nuclear force, the United States also has 500 "Minuteman"-3 land-based intercontinental missiles with a range of 13,000 kilometers, and 72 strategic bombers with 1,750 nuclear warheads. Most of these aircraft can take off from the United States and can fly to most parts of the world with a single refueling....
The shaft pump jet propulsion shields the propeller with a cylinder, and the water flow is accelerated by the rotor and then sprayed out through the draft tube, which can effectively improve the stability of the fluid field. Moreover, due to the low linear speed of rotation, the low-frequency noise is averagely required under the same thrust. It is more than 15 decibels lower than the seven-blade large inclined propeller. Once the shaftless pump is put into practical use in the future, the effect will be higher than that of the shaft pump.

U.S. Virginia-class attack nuclear submarine pump jet propulsion
In addition to making as little noise as possible, how to block the transmission of submarine sound is also a top priority, and this requires the laying of sound insulation tiles, sound insulation skins, and sound absorption layers. Most of these materials use rubber as the basic material, in which tiny metal particles are mixed. When the sound is transmitted, the metal particles in the rubber are oscillated by the sound to generate heat, thereby canceling the sound energy, thereby achieving a sound-absorbing effect. According to statistics from the United States, Russia and other countries, after laying the sound insulation layer, the range of the enemy's passive sonar can be reduced by more than 50%.

Iran attaches domestic rubber silencer tiles to Kilo-class submarines
In addition to the sound, the exposure of the snorkel when the submarine floats is also its biggest lethality! To reduce the risk of exposure to the floating snorkel state of conventional submarines, it is necessary to reduce the number of floating charging times. The most effective method for conventional submarines is

to use fuel cells, closed-cycle engines, Stirling engines, etc. that do not rely on aerodynamic devices (AIP power ), you can get two to three weeks of incubation time underwater, minimizing the number of floats. However, because the power of AIP devices is generally not strong, the underwater speed of AIP submarines is still very slow

Fuel cell technology

In addition to the several submarine stealth technologies introduced above, the use of natural circulation pressurized water reactors can reduce the probability of opening the main pump and reduce the generation of noise sources. The use of a low-resistance elongated drop-shaped shape reduces the openings of the hull, installs baffles for external equipment such as periscopes, and improves the technological level, which can also significantly reduce the generation of eddy currents and reduce noise decibels. Built six 670М ("ray-М") cruise missile nuclear submarines. The difference between it and the 670 is that it has been replaced with a П-120 "malachite" anti-ship missile system and improved electronic equipment. The "Ruby" Design Bureau designed the third-generation cruise missile nuclear submarine-Type 949 ("Granite" class). Its underwater displacement is 24,000 tons, its main weapon is 24 П-700 "granite" supersonic anti-ship missiles, and it uses the same dual-axis nuclear power device as the 941 boat. The use of wave-absorbing coatings can reduce the outward scattering of electromagnetic and infrared signals, and the use of star-sky satellites and inertial guidance can minimize the number of times the submarine floats and rests its course. At present, Russia’s latest Severodvinsk-class and the US’s most advanced Seawolf-class attack nuclear submarine use a variety of submarine stealth technologies, and its own noise intensity has been reduced to below 100 decibels, which can be completely hidden under the background of the ocean. , And difficult to be found and captured by the enemy.

French Triumph-class strategic nuclear submarine

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1 Structure of nuclear submarine The pressure hull of a submarine is generally divided into 3 to 8 watertight compartments, which are mainly weapon compartment, command compartment, power compartment, battery compartment and living compartment. Weapon bays include torpedo bays and missile bays. Modern nuclear submarine torpedoes are generally located in Qibu, where they are used to store and launch torpedoes and missiles.

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The development of stealth technology and weapon systems can be divided into exploration phase, development phase, and application phase.

A.

As soon as the aircraft appeared, people tried to reduce its visible light signature. Later, the focus was changed to anti-radar detection. In World War II, Germany, the United States, and the United Kingdom all tried to reduce the radar signature of aircraft. German submarine vent pipes have used paint that can absorb radar waves.

After the mid-1960s, the effectiveness of integrated air defense systems has been greatly improved, and the importance and urgency of improving aircraft survivability have become extremely prominent. Western countries have developed some tactical and technical countermeasures, and developed U-2 and A -12, YF-12, SR-71, D-21 and other aircraft with certain stealth capabilities. However, due to the lack of

systematic methods to improve survivability, and the lack of advanced technology to support stealth, no real stealth weapon system has emerged.

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Target When a submarine is navigating underwater, due to the impact of the propeller, the operation of various electromechanical equipment, the friction and collision of the hull with the water as it moves forward, a certain level of noise is emitted, resulting in a significant increase in the sound field intensity of the navigating sea area and becoming an enemy Fang's underwater acoustic detection equipment captures the target, so the noise level of the submarine is related to its survival in combat...

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Stealth aircraft

Driven by the strong demand for reducing characteristic signals to improve aircraft survivability, the requirements for the development of practical and true stealth aircraft with the main goal of reducing the radar cross section are proposed; due to theory, as well as computer, electronic, control, and material technology The F-117 A "Nighthawk", a practical first-generation stealth aircraft whose main goal is to reduce the radar cross section, came out in 1975. The U.S. Air Force began to develop the second-generation stealth aircraft in 1981, the B-2 stealth bomber.

In addition, F-16C, F/A-18C/D, B-1B, etc. have also adopted some stealth technology, and stealth technology has also been extended to various missiles, helicopters, unmanned aerial vehicles, and surface ships. The noise of submarines is decreasing at a rate of 10-20 decibels every 10 years. The noise of the world's best nuclear submarine has been reduced to 90-100 decibels, which is lower than the marine environment noise (115 decibels).

B.

The second-generation stealth aircraft was successfully developed. The first and second-generation stealth aircraft participated in military operations many times and achieved remarkable results. Started to develop the third-generation stealth aircraft. Stealth technology is promoted and transplanted to missiles, ships, helicopters, tanks, and even ammunition, ground equipment, clothing, and airports.

The U.S. Air Force began to deploy the B-2 stealth bomber in December 1993. This is a second-generation stealth aircraft that combines low observability, high aerodynamic efficiency, and large payload. The number of acquisitions is 21.

The U.S. Air Force began designing the F-22 Raptor fighter jet in the 1980s and began to develop the "Joint Strike Fighter" in 1993. They are all third-generation stealth aircraft. New information shows that new stealth aircraft are still being continuously updated. The United States, Russia, Central Europe and other countries are developing and innovating.

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Low detectability is not exactly the same as invisible to the naked eye in games or movies. At present, the stealth of aircraft mainly refers to reducing the detection ability of radar waves, but it also includes the processing of infrared characteristics, electromagnetic signals, and visual (such as low-visibility coating) to achieve the purpose of making it difficult for the enemy to detect. .

Because of the special medium of water, the main means of detecting underwater submarines is sonar, but for submarines close to the shallow surface, there are other means, such as magnetic anomaly, radar, and optical detection. Therefore, for submarines, invisibility or low detectability mainly refers to counter sonar. There are two aspects, one is to reduce internal noise spillover, and the other is to reduce the reflection of enemy sonar. The first is the treatment of internal noise. The biggest noise source of nuclear submarines is circulating pumps. Conventional submarines are diesel engines. The essence of these noises is the vibration of these machines. Therefore, the modern method is to actively reduce the vibration of the floating raft. As the name implies, the vibrating machine is placed on a platform that can also vibrate. When the machine vibrates, the platform also vibrates and resonates. In order to reduce noise spillover, another major noise source It is a propeller, which involves the manufacture and surface treatment of the propeller blade, which is to make the blade as smooth as possible without protrusions. Of course, another way is to change to a pump jet propeller, which can significantly reduce the noise of the propeller. In order to reduce the reflection of sonar, the method of submarine is to lay anechoic tiles on the surface of the hull, which is known to many people. The main component of this thing is usually rubber, which covers the submarine piece by piece like a tile. The internal holes can "absorb" sound waves. On the one hand, this can reduce the detection of enemy sonar, and on the other hand, it can also "lock in" internal noise. The anechoic tile can also make the submarine smoother. Stealth technology and weapon system

The second-generation stealth aircraft was successfully developed. The first and second-generation stealth aircraft participated in military operations many times and achieved remarkable results. Started to develop the third-generation stealth aircraft. Stealth technology is promoted and transplanted to missiles, ships, helicopters, tanks, and even ammunition, ground equipment, clothing, and airports.

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Other aspects are to counter other detection methods, such as degaussing submarines. The US Navy has facilities at the nuclear submarine base to degauss the Ohio class as a whole. The submarine also needs to deal with many aspects such as wake and periscope to achieve invisibility.

Submarines have a high cost of stealth, but the benefits are also very high. This is the same as the pursuit of stealth by fighters and bombers.

Launching missiles within the full combat depth of the submarine has higher concealment.

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E†National Army
Italian military

(Reproduced from the Swedish International Peace Research Institute, Wiki, etc.)
The Virginia-class attack nuclear submarine’s weapon load, speed, and submarine depth are not as good as the Seawolf class, but the silent ability inherits the super high water of the Seawolf class.

level. First of all, the main cabin of this class of nuclear submarine adopts a floating raft-type shock-absorbing overall module design, which greatly reduces the noise on the boat; second, this class of boats has the same latest mute technology as the Seawolf class, such as carefully designed turbines/ Piping settings, the polyurethane monolithic silencing tiles that are said to be used on the outside of the hull, the outer shape design of the hull to reduce water flow noise, the elastic shock-absorbing base of the main engine, and the new type of pump jet propeller; 600 noise/vibration detectors (there are only 26 in the Seawolf class), which can monitor the vibration of various places on the boat at any time, and deal with any abnormalities immediately to minimize the overall noise; in addition, in order to reduce the probability of detonating induction mines, This class of boats also use degaussing technology. As early as 2001, the U.S. Navy disclosed the design details of the improved Virginia class. The most notable of these was the use of "advanced command podium enclosures" similar to the Russian Type 705 and Type 971 attack nuclear submarines, which not only improved the submarine’s performance The invisibility of shallow seas can increase the space inside the enclosure and install more detection equipment. To

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Responsible for the overall design of nuclear submarines, and develop the nuclear power plant, submarine line type, pressure hull, air conditioning system, underwater sound, navigation, communication and other seven key technologies. Nuclear attack submarine is a type of submarine, referring to nuclear reactors as power Source designed submarine. Due to the production and operating costs of this submarine, plus the size and weight of related equipment, only military submarines use this power source. The nuclear-

powered submarine has an underwater endurance of 200,000 nautical miles and a self-sustaining power of 60-90 days or longer. As a strategic strike force, nuclear submarines can be equipped with ballistic missiles or flying missiles with nuclear warheads. According to weapons and equipment, it can be divided into torpedo nuclear submarine and missile nuclear submarine. Nuclear submarine is a strategic force in a country's submarines, and it is the main form of realization of the maritime-based nuclear force in the current military concept of the "trinity" of military nuclear energy. In military warfare, it has attracted much attention because of its strong endurance.

"Typhoon" class, the Soviet Union classified it as an underwater heavy ballistic missile nuclear cruiser. There is only one type of "typhoon" class,

The structure of the "Typhoon" class is completely different from the H, Y and D classes. The "Typhoon" class is equipped with solid-fuel missiles, which eliminates the "turtleback" phenomenon, and the price for this is to greatly increase the displacement of the boat. The water displacement of the "Typhoon" class is comparable to that of the guided missile cruiser "Peter the Great".

The "Typhoon" class has a water displacement of 23,200 tons and an underwater displacement of 48,000 tons; the maximum length is 172.8 meters, the maximum width is 23.3 meters, and the average draft is 11.0 meters. Nuclear power plant is OK-650 type, 2 pressurized water reactors, total power of 380 MW gear-driven steam turbine main unit 2×50,000 horsepower, 4 autonomous turbine generators 4×3200 kW; double propeller, 7 blades Low-noise fixed-pitch propeller, in the propeller duct; auxiliary power diesel generator 2×800 kW; lead-acid battery, auxiliary propulsion motor 2X190 kW; 2 outreach rotatable propellers, driven by electric motors, 750 kW. The Russian Typhoon-class nuclear submarine has surfaced and can carry 20 nuclear missiles with a maximum speed of 12 knots on the water and 25 knots underwater. The dive depth is 400 meters, self-sufficiency for 120 days, 160 crew members. Each boat is equipped with 2 crew members. With regard to the main tactical and technical elements of the "typhoon" level, there are also many inconsistencies or lack of clarity in the Russian reports, especially the reports on the displacement, there are more statements.

The "Seawolf class" attack nuclear submarine began to be manufactured in 1989, but then the Soviet Union collapsed and the Cold War ended. Originally planned to build 29 "Seawolf-class" attack nuclear submarines, because the budget is 33.6 billion U.S. dollars, the average is as high as 1.158 billion U.S. dollars, the United States thinks it is too expensive. In addition, because the US military budget was greatly reduced at that time, and the defense industry was generally in a slump, in the end, only three "Seawolf-class" attack nuclear submarines were built and stopped.

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Although only three "Seawolf-class" attack nuclear submarines were built, it is still very good even now because of advanced technology. The "Seawolf-class" attack nuclear submarine has a displacement of more than 9,000 tons. It is the first submarine to be constructed in a modular manner. Its outer shell and internal structure are all fixed structures. This design is very important for maintenance. The hull of the "Seawolf-class" attack nuclear submarine is made of high-tensile steel plates, so its maximum shallow depth reaches 610 meters. And it is also the first submarine designed with computer-aided design tool CAD.

It has a silent design, and the United States also mentioned the extreme. It not only has a silent design in the shape, but also has a silent design in the seams, hatches, and the beginning of the water tank. Try to make these parts simple and smooth to reduce noise. In addition, its rubber soundproof tiles even use noise reduction technology. Of course its ship’ s electrical design and weapon design,
The most unique aspect of the typhoon class is its structural form, an atypical double hull structure. There are several pressure hulls in the non-pressure hull.

If the missile launching tube is arranged in a pressure hull, a 16.0-meter-long P-39 missile must be arranged like a D-class nuclear submarine. That is, if the diameter of the pressure hull is expanded to more than 12 meters, there will still be one. A big "turtle back". The P-29PM of the D-4 missile is only 14.8 meters long, and the diameter of the pressure hull is only slightly larger than the 9.4 meters of the D-1.
In order to avoid the occurrence of "turtle back", the typhoon class has designed two pressure hulls parallel in the horizontal plane, which can be called "main pressure hulls". The missile launch tube is arranged between the two main pressure hulls, not in the main pressure hull. The diameter of the two main pressure hulls is slightly enlarged at the stern of the boat, but in the section where the missile launching tube is arranged, the diameter is only 7.2 meters. Although the displacement of the "Typhoon"-class strategic nuclear submarine is large, the level of displacement is not the fundamental basis for measuring the performance of the strategic nuclear submarine. The load capacity, the performance of the submarine-launched ballistic missile and the noise performance are more important than the displacement. In these aspects, the "typhoon" There is a big gap between the class of strategic nuclear submarines and the "Ohio" class of strategic nuclear submarines. In terms of ammunition capacity, the "Typhoon" class can carry 20 solid-fuel P-39 submarine-launched ballistic missiles, with a range of 8,000 thousand. Between meters and 10,000 kilometers, each P-39 can carry 10 nuclear warheads with the equivalent of 100,000 tons of TNT. It can be said that one "Typhoon" class nuclear submarine can destroy a small and medium-sized country. However, the "Ohio" class can It is equipped with 24 "Trident-II" submarine-launched ballistic missiles, and each "Trident-II" can carry 8 to 12 nuclear warheads with a range of about 12,000 kilometers. The reason why the smaller displacement of the "Ohio" class nuclear submarine is More submarine-launched ballistic missiles are installed, mainly because the "Trident-II" is smaller than the P-39. The launch weight of the former is less than 60 tons, while the launch weight of the latter is about 90 tons. The technological gap in the field forced the Soviet Union to build larger nuclear submarines to accommodate missiles that are difficult to make smaller. In terms of noise performance, the "Typhoon" class is also inferior to the "Ohio" class, and the noise level of the "Ohio" class is 100 The noise level of the "Typhoon" class is 115 decibels. Therefore, this arrangement is sufficient for the maximum width of the "Typhoon" class of 23.3 meters. Because the diameter of the P-39 missile is only 2.4 meters, the other Factors (such as the layout of the missile in the launch tube) and the wall thickness of the launch tube are estimated to be enough. The width of 23.3 meters is also sufficient. The Typhoon-class strategic nuclear submarine has an underwater displacement of over 40,000 tons, and the maintenance cost is very high.

20-02" Stockholm International Peace Research Institute
2019 Fact Sheet (for 2018)
SIPRI Military Expenditure Database International Strategic Research Institute

Top 15 Defence Budgets 2018
24.9
14
To
Hull parameters (basic type)
Captain 114.91 meters
Boat width 10.36 meters
Draft 9.3-10.1 m
6950 tons of water discharge
Underwater displacement 7800 tons/7925 tons
Speed 28 knots/34 knots (underwater)
Dive depth 244 meters (work)
450m-488m/500m (limit)
Self-sustaining power 90 days
The crew establishment is 134 (14 officers, 120 soldiers)
Transmission Single shaft and single propeller, pump-jet propulsion
Power system 1 S9G pressurized water reactor
2 main steam turbines with a power of 40,000 horsepower
1 auxiliary emergency propulsion motor
During the Cold War, the Soviet Union attached great importance to the development of military power in order to cope with the better overall national strength of the United States. The three armies of the sea, land and air received strong support. However, compared with the United States, the Soviet Union’s military power development has many differences, which are reflected in In the field of naval equipment, the Soviet Union prefers to develop nuclear submarines rather than aircraft carriers carrying carrier-based aircraft. Many senior Soviet officials believe that the aircraft carrier is just an iron coffin in the face of the combination of nuclear submarines, missiles and torpedoes. The impact of this view is far-reaching. In the end, the Soviet Union built the world’s largest nuclear submarine, the "Typhoon" class strategic nuclear submarine. This nuclear submarine has an underwater displacement of more than 40,000 tons, far exceeding the US military's "Ohio" class strategic nuclear submarine in the same period. . However, the service life of the "Typhoon" class nuclear submarine is not smooth. At present, 5 of the 6 "Typhoon" class strategic nuclear submarines built during the Soviet era have been decommissioned, and only one is in service. The fundamental reason is mainly because" The performance of the "Typhoon" class strategic nuclear submarine cannot keep up with the trend of the times. At the same time, the high maintenance costs are also one of the reasons why Russia retires the "Typhoon" class.

Although the displacement of the "Typhoon"-class strategic nuclear submarine is large, the displacement is not the fundamental basis for measuring the performance of the strategic nuclear submarine. The ammunition load, the performance of the submarine-launched ballistic missile and the noise performance are more important than the displacement. In these aspects, "Typhoon" There is a big gap between the "class strategic nuclear submarine and the "Ohio" class strategic nuclear submarine. In terms of ammunition capacity, the "Typhoon" class can carry 20 solid-fuel P-39 submarine-launched ballistic

missiles. The range of this type of missile is between 8,000 and 10,000 kilometers, and each P-39 can carry 10 With a nuclear warhead equivalent to 100,000 tons of TNT, it can be said that a single "Typhoon" class nuclear submarine can destroy a small and medium country. However, the "Ohio" class can hold 24 "Trident-II" submarine-launched ballistic missiles, and each "Trident-II" can carry 8 to 12 nuclear warheads with a range of about 12,000 kilometers. The reason why the smaller displacement "Ohio"-class nuclear submarine can carry more submarine-launched ballistic missiles is mainly because the "Trident-II" is smaller than the P-39. The launch weight of the former is less than 60 tons, and the launch weight of the latter. About 90 tons, the technological gap between the United States and the Soviet Union in the field of submarine-launched ballistic missiles forced the Soviet Union to build even larger nuclear submarines to accommodate missiles that are difficult to make smaller. In terms of noise performance, the "Typhoon" class is also inferior to the "Ohio" class. The noise level of the "Ohio" class is 100 decibels, and the noise level of the "Typhoon" class is 115 decibels.

No matter how hair is

In addition to lagging behind the "Ohio"-class strategic nuclear submarine in performance, the maintenance cost of the "Typhoon"-class strategic nuclear submarine also exceeds the former. It is reported that a "Typhoon" class will cost US$27 million in maintenance costs a year. If you want to upgrade a "Typhoon" class in depth, you will spend the cost of building two "Beifeng God" class strategic nuclear submarines. . After the disintegration of the Soviet Union, Russia's economic situation was not good. Instead of continuing to maintain the "Typhoon" class nuclear submarines, it would be better to retire them in advance, and the saved military expenses can be used for the development of new strategic nuclear submarines.

The "Beifeng"-class strategic nuclear submarine was born under this background. Compared with the "Typhoon"-class strategic nuclear submarine, the displacement of the "Beifeng"-class nuclear submarine is slightly smaller, with an underwater displacement of about 24,000 tons. It can carry 16 "Blava" submarine-launched ballistic missiles, and the newly delivered fourth "North Wind God" class nuclear submarine "Vladimir Grand Duke" can carry 20 "Blava" submarine-launched ballistic missiles. In terms of noise performance, the noise level of the "Beifeng Zhishen" class is slightly higher than 90 decibels, which is far better than the "Typhoon" class. The 20 missile launching tubes are arranged on both sides of the center line. The upper cover of the missile launching tube is to the side. Side open.

No missile launching tube is arranged in the pressure hull, which avoids opening large diameter holes in the pressure hull. If there are large-diameter openings, in order to ensure the strength of the pressure hull, the openings need to be reinforced with thick forgings and plate-rolled materials. Installing 20 missile launching tubes requires continuous openings on the pressure hull, which has a greater impact on strength. Behind the missile launching tube, the "mounted" is on the two main pressure hulls, and at the midline of the boat is a "pressure resistant central compartment". In the central compartment, the central command position and electronic equipment such as sonar and radar are arranged to become a pressure-resistant command platform. On both sides of the central section there is a floating rescue cabin, which can accommodate all crew members.

The method of setting the pressure-resistant podium in a horizontal pressure-resistant cylinder on the pressure hull has been used in large submarines in the past. This "old" layout is used in the "typhoon" class. . Today's submarines generally set the observation part of the periscope in the pressure hull. This pressure command cabin and the two parallel main pressure hulls form a "product" shape when viewed in cross section.

There is also a torpedo bay at the bow of the boat. The torpedo cabin has a torpedo launch tube, a spare torpedo rack, and a device for longitudinal and lateral transmission of torpedoes and a fast loading device. The torpedo cabin and the main pressure hull have channels. Below the torpedo cabin is the spherical main array of the sonar station.

The stern part of the two main pressure hulls has an enlarged diameter to a maximum of 10 meters. Inside each of the two main pressure hulls, there are sets of main power units arranged in steps, each of which has its own nuclear power unit OK-650 and the main steam turbine, which are installed in the same space as the auxiliary engines. Inside the module of the damping system. Typhoon class is a typical Cold War product. The purpose is to achieve the "mutual assurance of destruction principle." Compared with its rival, the American Ohio class, it is almost twice the size of the Ohio class. Equipped with 20 missile launch tubes loaded with SS-N-20 ballistic missiles. With a range of 8,300 kilometers, the typhoon can hit any target in the same hemisphere with her. Such an arrangement is beneficial to reduce the vibration and noise of the power plant and improve the vitality of the power system. According to new data released by Russia, the reactor can achieve natural circulation in the primary loop at higher power (no specific data has been published), that is, without starting the main pump, which can more effectively reduce the noise of the power plant.

The pressure hull, the pressure-resistant center section and the torpedo cabin are made of titanium alloy, and the non-pressure hull is made of steel. A special rubber hydro-acoustic silencing tile is laid on the outer surface of the non-pressure boat to improve the concealment of the boat. It is said that the underwater sound concealment of the boat is close to (slightly inferior to) the American Ohio-class, and is the best of all ballistic missile submarines in the Soviet Union.

2. TRIBON

This is the software currently used by most East Asian shipyards and design units, and it is very convenient to design. However, this software belongs to the special software of the shipbuilding industry, even professionals need a relatively long time to learn. South Korea is relatively mature in using this software, and there are many related secondary developments.

3. NAPA

The software is also a dedicated ship design software, which has very powerful functions in profile design. Especially in the design of large ships, NAPA has obvious advantages.

4. CATIA

This is an excellent production design software, but its application in the shipbuilding industry is not very common. Although both TRIBON and NAPA make 3D models inside, CATIA can make 3D models move. CATIA's simulation function is very powerful, and it is likely to be the future development direction of the shipbuilding industry. But CATIA has very high requirements for computer performance, and generally it can only run on a very well-configured PC or a relatively high-end graphics workstation.

According to Vittorio Vagliani, Managing Director of Quinettik GRC, "Paramarine has become the world's leading naval architecture software tool in the field of submarine design." In addition, there are two fully integrated platforms to design and analyze newly established submarines and surface ships. Computer variants, sea ships and SeaWeigh are loaded onboard.

The company also launched the latest version of Paramarine's extended functions, such as probabilistic damage modeling and assessment, and enhanced its emergency response, reporting and stability assessment capabilities.

The main weapon of the "Typhoon" class is P-39 (NATO codename: SS-N-20) ballistic missiles

The P-39 (SS-N-20) missile is a ballistic missile specially designed for "Typhoon" class nuclear submarines. It uses solid fuel and a three-stage propulsion submarine-launched intercontinental ballistic missile. The length is 16 meters and the diameter is 2.4 meters. It has a launch weight of 90 tons, can carry 10 sub-warheads, has a range of 8,000 to 10,000 kilometers or more, and a circular probability deviation of 500 to 600 meters. The P-39 missile is the only two solid-fuel submarine-launched ballistic missiles put into use by the Soviet Union (Russia) (Although the Bulava missile is also a solid fuel, it is still being tested.). Solid fuel has the characteristics of short preparation time and safety (liquid fuel is usually toxic, flammable and explosive), but it also brings about the problems of increased launch weight, shortened storage time and reduced range. The first batch of missiles was delivered to the Navy in 1983, which means that the ballistic missiles of the submarine were lacking in the early stage of service of TK-208 and the trial period of TK-202. The P-39 missile is fired from a "dry" launch tube using a gunpowder pressure accumulator, which does not require water injection. A gas space is formed around the missile during launch, which greatly reduces the hydrodynamic load of the missile in the underwater movement section. After the missile comes out of the water, a special engine separates the missile launch damping system from the missile and throws it to a safe distance away from the submarine. With the continuous improvement of the US anti-missile means and the plan to establish a missile defense system, the Soviet Union is also constantly Research and improve the combat survivability of its missiles in flight and increase the shooting accuracy. One of the solutions is to study and improve the optical sensors for celestial navigation of ballistic missiles. Nuclear submarines usually use pressurized water nuclear reactor devices, referred to as pressurized water reactors. The nuclear energy produced by the nuclear reactor cannot directly drive the submarine. It must undergo several energy conversions. Strategic weapons such as the Tu-160 strategic bomber, the "Beifeng"-class strategic nuclear submarine, and the "Yars" intercontinental ballistic missile are comparable to the armed forces of the United States.The basic process is: the nuclear fuel in the nuclear reactor generates extremely high temperature during nuclear fission, and the high temperature obtained is used to heat the high-pressure water in the primary circuit. After passing through the steam generator, this kind of high-heat and high-pressure water transfers the heat to the secondary circuit, so that the water in the secondary circuit is heated into steam, and then the steam is used to drive the steam turbine, and the propeller rotates through the transmission device, and finally drives the submarine to sail. The propulsion method is called "steam turbine propulsion".

There is also a "motor propulsion" method. It uses the steam provided by the nuclear reactor to drive a steam turbine generator to generate electricity, and then transmits the electrical energy to a high-power electric motor. The operation of the electric motor drives the propeller to rotate to achieve the purpose of submarine navigation.

Because the role of a nuclear reactor is to provide working steam, it is equivalent to a boiler that burns water, so some people call it an "atomic boiler." In 1984, he organized the development of a stable and reliable astronomical correction instrument for ballistic missiles with the participation of experts from various fields and under the leadership of experts, including missiles, missile control systems, command instruments and astronomical correction systems. expert. The new astronomical corrector should be able to resume its working performance within seconds of a nuclear explosion in enemy space.

Although the displacement and boat width of the Typhoon class are almost twice that of the Ohio class, the first 8 American boats (SSBN726~733) are equipped with "Trident"-I

(C4) missiles, with a range of 7400km, each missile can carry 8 separate guided multi-warheads with a power of 100kt TNT equivalent (the 9th to 18th boats of this class (SSBN734~743) are equipped with "Trident"-Ⅱ The missile has a range of 12000km, and each missile can carry 8 to 12 sub-guided multi-warheads with a power of 100kt or 300-475kt TNT equivalent, with a circular probability deviation of 90m), while the "Typhoon" class can only carry 20. The Ohio class still dominates in the number of missiles. But in fact, because each Trident missile carries 8 warheads, each P-39 missile can carry 10 warheads. In this way, 24*8=192, and "typhoon" level is 20*10=200. The “Titanium alloy” pressure-resistant shell construction of the typhoon class and the HY-130 high-strength steel in the construction materials, the conventional submarine has a maximum underwater speed of about 20 knots; the nuclear submarine has a high-power power unit, and the underwater speed is generally 25 The knot to 35 knots, and some even as high as about 40 knots. Therefore, the ability to maintain high-speed underwater navigation is another feature of nuclear submarines. Nuclear submarines can actively search for targets at a constant high speed, get rid of danger, seize positions, and rush into battlefields. For the same high-speed surface ship to escort, rather than just waiting for the target to enter its ambush range. The high speed of nuclear submarine provides nuclear submarine mobile and flexible combat characteristics, in terms of battlefield initiative, nuclear submarine in combat use A qualitative leap has taken place. And the equivalent of nuclear explosions is about 0.1 megaton TNT (100,000 tons, 1 megaton = 1,000,000 tons), so the "Typhoon" class is out of the destructive power of a single ship. The advantage. The biggest improvement between the P-39 and the former Soviet missiles is that the "Trident" uses three-stage propulsion and solid fuel. This way there is no difference in launch preparation and range, and because of the "Typhoon" class continuous firing Two missiles can be fired in a salvo, and the time-consuming launching of all missiles undoubtedly has the advantage of the "Typhoon" class.

However, because the Soviet Union's solid-fuel ballistic missile technology is not as mature as the United States, there is still a lot of gap between the P-39 missile and the Trident missile. First, the launch weight of the P-39 is 90 tons, while the Trident II is only less than 60 tons, which caused problems such as increased recoil after launch. Secondly, in terms of accuracy, the circular probability error of the P-39 equipped with the "Starlight" astronomical guidance system is 500 to 600 meters, while the trident type is only 380 to 420 meters. Although the maintenance cost and manufacturing cost of the P-39 is not comparable to that of the Trident missile. The Typhoon-class nuclear submarine has 6 533 mm torpedo tubes and fast loading

devices, which can be equipped with 22 torpedoes, including EST-53-65K, СЭТ-65 and САЭТ-60M and "waterfall" rocket torpedoes, and can also be replaced with mines.

In order to guard against low-altitude aircraft and helicopters, it is equipped with 8 "needle" air-to-air missiles, which can only be launched on the surface. In fact, this is not important, but there are reports in the West that Russia has designed self-defense air-to-air missiles that can be launched from underwater for the "Typhoon" class and other new ballistic missile nuclear submarines.

The most unique aspect of the typhoon class is its structural form, an atypical double hull structure. There are several pressure hulls in the non-pressure hull.
Because the size and weight of the P-39 missile (NATO codename SS-N-20) are much larger than any previous liquid fuel missiles, and the boat is equipped with a sonar with better performance, size and weight. , Radar and other electronic equipment, so that the traditional typical double hull structure such as H-class, Y-class and D-class submarines will not change much.
If the missile launching tube is arranged in a pressure hull, a 16.0-meter-long P-39 missile must be arranged like a D-class nuclear submarine. That is, if the diameter of the pressure hull is expanded to more than 12 meters, there will still be one. A big "turtle back". The P-29PM of the D-4 missile is only 14.8 meters long, and the diameter of the pressure hull is only slightly larger than the 9.4 meters of the D-1.
In order to avoid the occurrence of "turtle back", the typhoon class has designed two pressure hulls parallel in the horizontal plane, which can be called "main pressure hulls". The missile launch tube is arranged between the two main pressure hulls, not in the main pressure hull. The left and right sides of the typhoon class are two separate pressure-resistant shells. Nuclear reactors and steam turbine propulsion equipment, torpedo tubes, and other control equipment are installed in them. The SS-N-20 nuclear missile launching tube is installed in the middle of the submarine. Since the "surface-to-surface missile launching tube" is made of the same material as the pressure-resistant shell, it can also be regarded as a pressure-resistant shell. Therefore, it can be said that the "Typhoon class" has three pressure-resistant shells, two main pressure-resistant shells. The diameter of the hull is slightly enlarged at the stern of the boat, but in the section where the missile launching tube is arranged, the diameter is only 7.2 meters. Therefore, this arrangement is sufficient for the maximum width of 23.3 meters for the "typhoon" class. Because the diameter of the P-39 missile is only 2.4 meters, 20 missile launching tubes are arranged on both sides of the center line, and the upper cover of the missile launching tube is opened to the side.
No missile launching tube is arranged in the pressure hull, which avoids opening large diameter holes in the pressure hull. If there are large-diameter openings, in order to ensure the strength of the pressure hull, the openings need to be reinforced with thick forgings and plate-rolled materials. Installing 20 missile launching tubes requires continuous openings on the pressure hull, which has a greater impact on strength. Modern machinery manufacturing design and manufacturing technology requires high-end manufacturing and design, otherwise, structural safety issues and so on will occur, leaving behind troubles. Behind the missile launch tube, the "mounted" is on the two main pressure hulls, and at the midline of the boat is a "pressure resistant central compartment". In the central compartment, the central command position and electronic equipment such as sonar and radar are arranged to become a pressure-resistant command

platform. On both sides of the central section there is a floating rescue cabin, which can accommodate all crew members. Borei-class Yuri Dolgoggi missile nuclear submarine

To ensure its excellent underwater navigation performance and stealth effect, the Okrylov Central Scientific Research Institute conducted a lot of analysis, research and testing on the hull structure, and optimized the streamlined shape of the approximate elongated droplet shape among several schemes. , Similar to the 971 Akula class (NATO codename "Shark"). This kind of exterior structure can reduce the friction between the hull and the water flow while ensuring high underwater speed, and reduce the noise during navigation.

In terms of firepower, the first "North Wind God" is equipped with 16 missile launchers and 12 intercontinental missiles, with a range of 15,000 kilometers and a hit accuracy of 300 to 500 meters. It is expected that from 2005 to 2007, the newly commissioned "North Wind God" class submarines will be equipped with 16 state-of-the-art submarine-launched "Poplar"-M or SS-N-28 intercontinental ballistic missiles. The "White Poplar"-M intercontinental missile has a range of up to 20,000 kilometers and a circular probability deviation of less than 60 meters. It can implement maneuver penetration and is the nemesis of the missile defense system; SS-N-28 is a level 3 solid fuel missile with a long bullet. It is 14.8 meters, weighs 35 tons, and has a range of 10,500 kilometers. However, the newly modified "Trident" missile carried by "Ohio" has a maximum range of 11,200 kilometers with a circular probability deviation of 90 meters, and its technical indicators are not as good as the "White Poplar"-M missile. In addition, the "North Wind God" is also equipped with a large number of self-defense weapons: 4 to 6 torpedo tubes, which can carry 18 to 40 torpedoes and anti-submarine missiles, enhancing the self-defense capability. The Russian Navy is also considering equipping the new "God of the North Wind" with high-speed rocket torpedoes with a speed of 200 knots in the future. This torpedo can not only effectively anti-submarine, but also anti-torpedo. Therefore, the comprehensive firepower of the "North Wind God" is stronger than the "Ohio" class nuclear submarine.

power system

The main power plant of the North Wind God is an OK-650 type pressurized water reactor and a steam turbine, single shaft. Among them, the OK-650 type pressurized water reactor is also the main power unit of the Typhoon class, with a maximum power of 380 MW and a maximum output power of 74570 kilowatts of steam turbines. The strong main power unit makes the maximum underwater speed of this class boat reach 29 knots. Underwater maneuverability exceeds the Ohio class of the United States. In addition, it is equipped with 2 low-noise propulsion motors for quiet navigation at low speed underwater, and it also has the ability to silently float under ice floes.

Quiet performance

Based on the noise reduction achievements of previous generations of nuclear submarines such as Akula and Oscar, the designers spent a lot of effort to improve the underwater mute performance of the North Wind God by a large margin. First of all, the surface of the North Wind God’s hull is covered with high-efficiency anechoic tiles with a thickness of more than 150 mm. At the same time, the main noise sources such as the main engine are installed with an integral floating raft-type double-layer vibration damping base and sound insulation cover. In addition to the noise reduction design, the designers have

also taken some unique invisible measures to eliminate infrared characteristics, magnetic characteristics, wake characteristics, etc.

In order to avoid the tracking of the US anti-submarine system, the Russian Krylov Central Research Institute conducted a lot of analysis and research on the hull structure. In terms of styling, the researchers chose a streamlined shape that approximates the elongated drop shape. This structure not only ensures the high speed of the submarine, but also reduces the friction between the hull and the water flow and achieves noise reduction.

In addition, on the surface of the submarine, the designers also specially laid a layer of high-efficiency anechoic tiles with a thickness of 150 mm, and the main noise sources such as the main engine were also installed with a damping base and a soundproof cover. It is speculated that the underwater navigation noise of the "North Wind God" is only 108 decibels, which is lower than that of the "Ohio" class submarine that has always been known for its quietness.

strategic missile

The first boat of the North Wind God-class is equipped with 16 missile launching tubes and 16 "round hammer" (SS-NX-30) intercontinental missiles (also known as "Blava" intercontinental missiles), with a range of more than 8000 kilometers and a hit accuracy of 60 meters, the missile cabin is located behind the podium enclosure. Submarines of the same type will then be fully equipped with 16 "Hammer" strategic missiles. The "Trident-II" intercontinental ballistic missile equipped with the Ohio class of the United States has a maximum range of 11,000 kilometers, and each carries 9 warheads, which is more than the 6 warheads of the Round Hammer.

The main technical indicators of the "Hammer" missile are as follows: the projectile diameter is 2 meters, the launch weight is about 37 tons, the range is more than 8000 kilometers, the hit accuracy is 60 meters, and the missile is equipped with six nuclear warheads with the equivalent of 100,000 tons of TNT. It uses three-stage solid rockets. The engine serves as a power plant.

In order to effectively respond to the US missile defense system, the missile is equipped with a shield against radiation and electromagnetic interference, and a decoy device is added to increase the strength of the missile shell so that it can withstand the impact of a nuclear explosion at a distance of 500 meters. At the same time, the speed of the active phase of the missile flight is much higher than that of other similar missiles, which can effectively avoid being destroyed by the anti-missile system during the initial ascent stage of launch. In addition, the warhead section is equipped with a terminal booster system. The warhead can maneuver by itself to adjust the attack direction in the final flight. Inertial navigation and satellite positioning receivers are installed on the warhead to ensure strike accuracy. On the whole, the penetration capability of "Blava" is better than that of "White Poplar-M". Of course, such excellent performance makes the "Hammer" missile expensive to build, each about 50 million US dollars.

Conventional weapons

The North Wind God is equipped with 6 533 mm torpedo launchers, which can launch 16 torpedoes and SS-N-15 anti-submarine missiles. It is also equipped with SA-N-8 short-range ship-to-air missiles, which is equivalent to its own defense capabilities. Tough. The Russian Navy is still considering the future equipment of the "Storm" high-speed torpedo with a speed of 200 knots. This torpedo can not only

effectively anti-submarine, but also anti-torpedo. Once it is equipped, it will undoubtedly be a nightmare for its opponents.

electronic system

Due to historical reasons, the former Soviet Union has always been far behind developed countries such as the West, especially the United States, in the electronics industry, and the backward electronic system has severely restricted the development of Soviet/Russian nuclear submarines. However, Russian designers have made great efforts in the electronic warfare system of the North Wind God submarine, which greatly narrowed the gap with the advanced level of the West.

"North Wind God" class submarines use modern electronic equipment extensively, and its interior uses fully digital electronic equipment and flat panel displays. The boat is also equipped with a "coach" type combat control and command system and a set of "Skat" integrated sonar system. As the equipment automation of the entire submarine has been greatly increased, the number of crew members of the "North Wind God" has also been reduced. At the same time, automation and digitization have also expanded the autonomous cruising time of the "North Wind God" class submarine to 100 days and nights, which can achieve the goal of launching.

The method of setting the pressure-resistant podium in a horizontal pressure-resistant cylinder on the pressure hull has been used in large submarines in the past. This "old" layout is used in the "typhoon" class.

Deep sea ghost-nuclear submarine

Nuclear submarine refers to a submarine powered by nuclear energy. Compared with conventional power submarines, it has the advantages of high speed, high self-sufficiency, strong attack power, high endurance, and long-term concealed activities underwater. Since the first nuclear submarine of the United States entered service in September 1954, countries have built more than 500 nuclear submarines, and more than 160 are still in service. After more than 40 years of development, all countries have built three nuclear submarines: ballistic missile nuclear submarine, attack nuclear submarine, and cruise missile nuclear submarine. As a nuclear submarine as a strategic deterrent,

The most modern attack nuclear submarine-the US "Seawolf" class nuclear submarine

This class of boat is a kind of the most modern and most combative attack nuclear submarine with very advanced comprehensive performance. It is mainly used for anti-submarine in the deep sea area. It can also effectively break through the enemy's anti-submarine obstacles. Ideal equipment.

The boat is 107.6 meters long, 12.9 meters wide, has a underwater displacement of 9142 tons and a dive depth of 610 meters. With an underwater speed of 38 knots, it is the highest speed and deepest submarine of the US Navy. Equipped with one S6W type pressurized water reactor, with a life span of 13 years and an endurance of 1007Y nautical miles. The power plant is 2 steam turbines and 1 auxiliary propulsion motor, with 134 personnel.

The boat is equipped with more torpedo tubes and a larger arsenal. The total number of torpedoes, missiles and unmanned submersibles launched by the torpedo tubes on the boat is 50 pieces of equipment. These include 12 Tomahawk submarine cruise missiles and Tomahawk anti-ship missiles. The anti-

submarine weapon includes 8 660 mm torpedo tubes, which can be equipped with MK-48 enhanced (ADCAP) wire guided torpedoes. The boat is equipped with BQQ-SD integrated sonar system, including BQS-24 active close-range detection sonar, TB-16 and TB-29 two towed line array sonars, and BQG-5D passive reconnaissance sonar. Advanced sonar has multiple functions such as alerting, searching, tracking and positioning, target recognition and underwater communication.

Electronic warfare equipment includes WLY-1 acoustic countermeasure system, torpedo decoy, WLQ-4(V) electronic reconnaissance equipment, and BLD-1 electronic reconnaissance equipment. The command and control system includes the BSY-2 combat data system, the USC-38 UHF military satellite communication terminal, the maritime joint command information system, and the MK-2 combat data system.

Russian "Typhoon" class ballistic missile nuclear submarine

"Typhoon" class ballistic missile nuclear submarine is currently the world's largest displacement submarine. The first-class boat started construction in 1977 and entered service in 1980. The boat is 171 meters in length, 25 meters in width, 13 meters in draft, 21,500 tons of water displacement, and 26,500 tons of underwater displacement; it is equipped with 2 pressurized water reactors, 2 steam turbines, twin shafts, ducted propellers, and a water speed of 19 The underwater speed is 26 knots, and the diving depth is 300 meters. It has an establishment of 150 people and implements a two-shift crew rotation system.

is mainly equipped with 20 SS-N-20 ballistic missiles (range 12,000 kilometers), each with 6-9 multi-guided warheads with a power of 1077 tons of TNT equivalent, which can strike any strategic target in the world. It is also equipped with SS-N-15, SS-N-16 anti-submarine missiles and 6 torpedo tubes. The total load is 36 torpedoes and anti-submarine missiles. The electronic warfare support equipment includes the "round-brimmed hat" warning radar, the "garden light" direction finder, and the "Klimny" 2 friend or foe identifier. The boat is also equipped with advanced electronic equipment and sonar systems, and has the ability to sail under 3 meters of Arctic ice.

French "Ruby" class nuclear-powered attack submarine

This class is 72 meters long, 7.6 meters wide, has a draft of 6.4 meters, an underwater displacement of 2670 tons, an underwater speed of 25 knots, and a dive depth of 300 meters. It is the smallest nuclear submarine in the world.

This class of submarine is equipped with "Flying Fish" missiles, with 4 533 mm torpedo tubes, with a total load of 18 torpedoes and missiles. The most striking feature of this class is its CAP type pressurized water reactor. This type of pressurized water reactor has a series of advantages such as compact structure, simple system, small size, light weight, easy installation and debugging, and can increase shaft power. It also helps to adopt natural circulation cooling between the reactor's primary circuit to reduce the submarine's Radiated noise.

This class of boat is equipped with advanced sonar and fire control systems, as well as 2 periscopes with thermal imaging and laser ranging functions and several radars.

Russian "Shark" class nuclear submarine

This class of boats, also known as the "Acura" class, is a multi-purpose nuclear-powered attack submarine. It is Russia's largest number of first-class submarines built after the V-class attack nuclear submarine. In addition to performing various tasks such as anti-submarine, anti-ship, reconnaissance, and escort, it can also cooperate with surface ships.

The hull of this class is wide and has a drop shape. The design fully absorbs the successful experience of the previous classes of submarines, and is the first-class nuclear-powered attack submarine that satisfies the Russian Navy in terms of performance. The slender podium enclosure of the boat is particularly eye-catching, and some important water environment sensors are arranged on the front edge of the enclosure and the front hull of the boat. The boat is 115 meters long, 14 meters wide, and has a draft of 10.4 meters; the water displacement is 7,500 tons, the underwater displacement is 9,100 tons, and the underwater speed is 32 knots; the maximum diving depth can reach 1,000 meters, which can be called the deepest dive. Nuclear submarine. The first boat entered service at the end of 1985, but unfortunately sank in an accident in 1989.

The boat has very powerful firepower and can launch SS-N-21 cruise missiles, SS-N-15, SS-N-16 anti-submarine missiles; equipped with 4 533 mm and 4 650 mm torpedo tubes, with a total load of 14 Both missiles and torpedoes can carry nuclear warheads and have strong attack capabilities.

The French strategic nuclear submarine "Triumph"

The French nuclear submarine "Triumphal" is currently the world's most "quiet" offshore platform. The boat has a total length of 138 meters, a width of 12.5 meters, a height of 12.5 meters, a horizontal tail fin width of 17 meters, and a surface navigation draft of 10 meters. The surface displacement is 12,640 tons, the underwater displacement is 14,335 tons, the surface speed is 20 knots, the underwater speed is 25 knots, the diving depth exceeds 300 meters, and the crew is 111. The main weapons are M-45 strategic missiles, 16 strategic missile launching tubes, and the "Flying Fish" SM-39 submarine tactical missile.

The Triumph-class nuclear submarine adopts a streamlined shape, emphasizes the control of fluid noise, and reduces the appendages that can generate eddy current noise. For the appendages that must be retained, the surface transition is smooth.

The nuclear submarine with the highest voyage rate-the US "Ohio" class ballistic missile nuclear submarine

The "Ohio" class ballistic missile nuclear submarine is the most advanced strategic missile nuclear submarine in active service in the U.S. Navy. It is also the submarine with the highest voyage rate. It cruises at sea for an average of 70 days, returns to the base for 25 days for replenishment and repair, and once again patrols at sea. The service life of this class boat is 30 years, and it is overhauled every 9 years. The sailing rate can reach 65%-70%, and the endurance can reach 1 million nautical miles.

This class of boat was built by the Groton Shipyard of General Electric Company, the first boat "Ohio" started construction in April 1976, launched in March 1979, and entered service in November 1981, a total

of 18 ships were built. The "Ohio" class submarine is 170.7 meters long, 12.8 meters wide, has a displacement of 18,750 tons, an underwater speed of 24 knots, a dive depth of 244 meters, and a staff of 155. Equipped with 24 "Trident"-1 submarine ballistic missiles or "Trident"-2 submarine ballistic missiles, using a vertical launch system, 4 missiles can be launched within 40 seconds, and all missiles will be launched in 10 minutes. Equipped with 4 533mm MK-68 torpedo tubes and other weapons.

Russian V-class attack nuclear submarine

Russia’s V-class nuclear attack submarines are divided into Type I, Type II, and Type III. Currently, nearly 50 are in service, making it the largest number of attack nuclear submarines in service.

The Type I boat is 94 meters long, has a underwater displacement of 5,300 tons, and an underwater speed of 32 knots. The main weapon is 18 torpedoes or missiles. It is an attack submarine specially designed for anti-submarine and anti-ship missions. It is also the first time that the Soviet Union uses water droplets. A nuclear submarine with 60 mm thick anechoic tiles laid on the hull and outer shell.

Type II boat is 103 meters long and has an underwater displacement of 5,800 tons. The main weapons are SS-N-15 anti-submarine missiles and SS-N-16 anti-submarine missiles. It is the first nuclear submarine equipped with a starlight navigation system in the Soviet Union.

The Type III nuclear submarine has a water displacement of 5,800 tons, an underwater displacement of 6,000 tons, a length of 107 meters, a width of 10.6 meters, an underwater speed of 30 knots, and a dive depth of 400 meters. The weapon system includes 2 533 mm and 4 650 mm launchers, which can launch SS-N-21 ground attack missiles, SS-N-16 anti-ship missiles, 53 torpedoes and 65 anti-ship torpedoes.

Strategic nuclear submarine-American "Lafayette" class ballistic missile nuclear submarine

The boat has been equipped with 14 sonars at most. In addition to BQR-7, BQR-15, BQR-19, BQR-21, BQR-4, etc., it was also equipped with BQR-2 passive ranging sonar, WQC-1 Communication sonar, BQQ-3 target identification sonar, friend or foe identification sonar, UQS-1 mine detection sonar, BQN-1 sounding sonar, WIR-2 reconnaissance sonar and BLQ-6 high-frequency echo increase in weight Generator and sound velocity gradiometer, etc.

The boat is 129.5 meters long, 10.1 meters wide, has a displacement of 8,250 tons, an underwater speed of 25 knots, an endurance of 400,000 nautical miles, and a manpower of 143.

is equipped with 16 "Poseidon" submarine ballistic missiles or "Trident"-1 submarine ballistic missiles, and 4 533 mm MK-65 torpedo tubes. Electronic warfare equipment includes 8 MK-2 decoy launchers, WLR-8 electronic warfare receivers, and WLR-10 radar early warning equipment. The command and control system includes the MK-113 torpedo shooting command system and the MK-88 missile shooting commander.

Russian A-class nuclear-powered torpedo attack submarine

The Russian A-class nuclear-powered torpedo attack submarine is currently the fastest submarine in the world, with a maximum diving depth of about 900 meters and a maximum speed of 42 knots.

Compared with other Russian submarines, this class has fewer water holes on the side and smooth surface of the hull, so it is very suitable for horizontal high-speed navigation. The podium is low and smooth, like half a drop of water lying on the back of the submarine. The hull is streamlined and smooth. It not only has low sailing resistance, but also reduces the heel angle when turning at high speeds. The hull of the hull is coated with paint up to 150 mm thick, which can not only absorb sound waves, but also reduce resistance, vibration and noise.

. Today's submarines generally set the observation part of the periscope in the pressure hull. This pressure command cabin and the two parallel main pressure hulls form a "product" shape when viewed in cross section.

There is also a torpedo bay at the bow of the boat. The torpedo cabin has a torpedo launch tube, a spare torpedo rack, and a device for longitudinal and lateral transmission of torpedoes and a fast loading device. The torpedo cabin and the main pressure hull have channels. Below the torpedo cabin is the spherical main array of the sonar station.

The stern part of the two main pressure hulls will increase in diameter, reaching a maximum of 10 meters. Inside each of the two main pressure hulls, there are sets of main power units arranged in steps, each of which has its own nuclear power unit OK-650 and the main steam turbine, which are installed in the same space as the auxiliary engines. Inside the module of the damping system. Such an arrangement is beneficial to reduce the vibration and noise of the power plant and improve the vitality of the power system. According to relevant information released by Russia, the reactor can achieve natural circulation in the primary loop at higher power (its detailed data is not released, which is highly confidential), that is, the main pump does not need to be activated, which is more effective Vigorously reduce the noise of the power plant.

The main pressure hull, the pressure-resistant central section and the torpedo compartment are made of titanium alloy, and the non-pressure hull is made of steel. A special rubber hydro-acoustic silencing tile is laid on the outer surface of the non-pressure boat to improve the concealment of the boat. It is said that the underwater sound concealment of the boat is close to that of the Ohio class of the United States and is the best of all ballistic missile submarines of the Soviet Union (Russia).

The Soviet/Russia has not published a general layout plan of the "typhoon" class so far. What you can see is a longitudinal section without the layout of the cabin equipment. No detailed drawings or design drawings such as plan and cross-section drawings have been seen, and the Soviet/Russia has never announced the shielding and channel settings of the reactor compartment. Therefore, regarding the general layout of the typhoon, there are very few reports from Russia. (The world's heavyweight nuclear submarines, strategic bombings, nuclear missiles, aircraft carriers, and space weapons are all highly confidential and top-secret technical materials, which are generally not disclosed. The commercial value and military value are immeasurable. The Yankee-class K129 missile nuclear submarine, equipped for the former Soviet Union in the 1970s and 1980s, has an underwater displacement of more than 9,000 tons and is equipped with 16 submarine-launched missile launching units. It is the main underwater force of the former Soviet Union and is frequently implemented. A strategic duty mission, but this submarine had an unimaginable silo explosion accident during a mission, which directly led to the sinking of the submarine, and the missiles on the boat also disappeared.Technical drawings and data parameters are more important. )

However, according to various Russian sources, there are 19 cabins in this "typhoon" class. Only the torpedo compartment, missile compartment, central part and electronic equipment compartment, reactor compartment and steam turbine compartment are indicated on the longitudinal section. Some of the cabins are in the two main pressure hulls. For other compartments, no indication or explanation is given on the longitudinal section. A combat-ready missile submarine is a submarine that uses shipboard nuclear missiles to conduct combat-ready nuclear attacks against important targets on the enemy's land. It is mostly nuclear-powered, the main weapon is submarine-to-surface missiles, and it is equipped with torpedoes for self-defense. Combat readiness missile submarines, land-based combat readiness missiles, and strategic bombers together constitute the three pillars of nuclear deterrence and nuclear strike forces in the current nuclear military in the country, and they are the most concealed/sudden of them.

Submarine-to-surface combat readiness missiles are divided into ballistic and cruise missiles. The United States began to develop the "Tiens Star-I" cruise submarine missile in 1947. It was successfully launched on a submarine in 1951 and officially equipped with a submarine force in 1955, and the first batch of strategic missile submarines were born. The Soviet Union used a submarine to launch a ballistic missile modified from a land-based tactical missile for the first time in September 1955. In 1958, it first used a conventionally powered Z-V ballistic warfare missile and became the world's first ballistic submarine. In July 1960, the US "George Washington" nuclear submarine launched the "Polaris" A1 submarine ballistic missile for the first time underwater, which was the world's first ballistic missile nuclear submarine.

The reserve buoyancy of the "Typhoon" class is great, but how many main ballast tanks there are and how they are arranged in the atypical double hull of the "Typhoon" class cannot be seen in the longitudinal section. There is also Russian data that the reserve buoyancy of the "typhoon" class is 31.3%.
According to Russian information, the "Typhoon" class also has some special ballast tanks used to float the submarine above the cruise waterline. This is because the typhoon-class draft is deep. If these ballast tanks are blown out, the draft of the boat is reduced, and it can enter the base of the Northern Fleet. According to analysis, these ballast tanks are not the main ballast tanks. They are not only full of water in the underwater state, but also in the water state (the cruise state where the main ballast tanks are completely blown off). The method of steering adjusts the navigating submarine to a safe depth of 30 meters from the surface of the water (safe depth is the limit depth to prevent collisions with surface vessels). When it continues to float to a depth of 10-30 meters, it is a dangerous depth, and it floats to about 10 meters. It belongs to the periscope depth. After reaching the periscope depth, it can be drained and floated. Only when the submarine enters the base, in order to reduce the draught of the boat, the water in these ballast tanks is blown off. At this time, the main ballast tanks are blown off, and these "buoyancy tanks" are also blown off. When cruising, the "buoyancy chamber" must be filled with water in order to make the submarine dive quickly and shorten the dive time.

The installation of ballast tanks that provide buoyancy reminds people of the "buoyancy tanks" that existed in the development of submarines. In the early stages of submarine development, in order to take care of the submarine's surface navigation status, a "buoyancy cabin" was installed at the bow of the boat. The "buoyancy cabin" is filled with water when it is underwater. When sailing in wind and waves on the water, when the bow of the boat is buried under water, the buoyancy cabin will not enter the water, but provides buoyancy and does not make the bow sink.

missile

The main weapon of the "Typhoon" class is P-39 (NATO codename: SS-N-20) ballistic missiles

The P-39 (SS-N-20) missile is a ballistic missile specially designed for "Typhoon" class nuclear submarines. It uses solid fuel and a three-stage propulsion submarine-launched intercontinental ballistic missile. The length is 16 meters and the diameter is 2.4 meters. It has a launch weight of 90 tons, can carry 10 sub-warheads, has a range of 8000 to 10000 kilometers (various materials provide different data), and the circular probability deviation is 500 to 600 meters. The P-39 missile is the only two solid-fuel submarine-launched ballistic missiles put into use by the Soviet Union (Russia) (Although the Bulava missile is also a solid fuel, it is still being tested.). Solid fuel has the characteristics of short preparation time and safety (liquid fuel is usually toxic, flammable and explosive), but it also brings about the problems of increased launch weight, shortened storage time and reduced range. The first batch of missiles was delivered to the Navy in 1983, which means that the ballistic missiles of the submarine were lacking in the early stage of service of TK-208 and the trial period of TK-202.

The P-39 missile is fired from a "dry" launch tube using a gunpowder pressure accumulator, which does not require water injection. A gas space is formed around the missile during launch, which greatly reduces the hydrodynamic load of the missile in the underwater movement section. A ballistic missile nuclear submarine launches missiles from underwater and requires the following devices:

1. Missile launching tube-used to store, protect and launch missiles. Prepare for launch.

2. Support system—used to provide electric and hydraulic (and pneumatic) power sources; set temperature control and monitoring for the missile and launch system; and devices for monitoring the state of the missile; the missile balance tank is used to inject seawater after the missile is launched. The purpose of submarine balance.

3. Fire control system-fire control system. It is used to check the preparation of the missile before launch; calculate target data, determine the launch position, attack elements, etc. The missile can only be launched after inputting these data into the missile's guidance computer.

4. Missile launching system-there are two launching methods: hot launch and cold launch. In fact, it is a matter of the timing of the ignition of the missile engine. The missile ignited in the launch tube and launched with its own thrust is called "hot launch", also called " "Self-ignition", "wet launch" or "static launch"; use the independent gas generator on the boat to produce high-pressure steam to push the missile out, and then ignite the missile after it leaves the hull. This method is called "cold launch". Also called "elastic launch", "dry launch" or "power launch". At present, the strategic missile launch methods of nuclear submarines in various countries seem to be "cold launch." Because the cold launch has many advantages, such as saving the consumption of propellant in the silo, minus the thick protective cover at the tail of the missile, reducing the launch weight and achieving the miniaturization of the missile; reducing the protective facilities in the launching barrel, making the structure simple , The cost is low, the volume in

the barrel is increased, and missiles with larger diameters can be configured; the barrel is not affected by gas and flame.

When launching, the submarine is generally at a depth of 30-50 meters underwater. First, inflate the launch tube to make the pressure in the tube equal to the pressure of the sea water outside the tube, then open the launch tube cover, and the diaphragm at the mouth of the tube separates the water. Start the launch power, the power source can be high-pressure air, steam or gas. The launch power system ignites the gunpowder in the gas generator, and the generated high-temperature and high-pressure gas flow passes through the cooler to heat the water in the cooler to produce high-pressure steam. This high-temperature and high-pressure gas-steam mixture enters the launch tube and pushes the missile upward. , Breaks through the diaphragm of the cylinder mouth, enters the water, then rushes out of the water and rises into the air. The rocket engine ignites itself and flies to the target according to the predetermined orbit. After the missile comes out of the water, a large amount of seawater pours into the barrel, and then closes the lid of the barrel, and discharges part of the excess seawater into a special water tank before being discharged out of the boat. The weight of the seawater in the barrel is equal to the weight of the missile to maintain the balance of the submarine. In order to prevent seawater from corroding the cylinder wall, an anticorrosive agent must be injected into the cylinder. After returning to the base, drain the seawater in the cylinder in time and flush the equipment in the cylinder with fresh water.

In the past, Russia’s missiles used mostly liquid fuels, and most of them were “thermal launches,” which had a large thrust, and the attitude of the missiles was not susceptible to the influence of sea waves after the water was released.

Of course, the missile needs to have a set of guidance system. After the missile is out of water, a special engine separates the missile launch damping system from the missile, and has other device configurations, and throws it to a safe distance away from the submarine. Because the P-39 missile is too large in size and weight, the Moscow Transport Machinery Manufacturing Bureau has also developed a special loading equipment, including a double-carrier overhead crane with a lifting capacity of 125 tons.

With the continuous improvement of U.S. anti-missile means and the plan to establish a missile defense system, the world’s first nuclear submarine was the U.S. Nautilus, which was actively initiated, developed and built by American scientist Hyman Rickover. He is known as the "father of nuclear submarines." In 1946, a group of scientists led by Rickover began to study nuclear reactors for ships, which later became "ship-borne pressurized water reactors" widely used on submarines. The following year, Rickover proposed to the US Navy and government to build nuclear-powered submarines. In 1951, the US Congress finally passed a resolution to build the first nuclear submarine. The Nautilus nuclear submarine started construction in June 1952, and it was the first test voyage that began on January 24, 1954. The first test voyage demonstrated the superiority of nuclear submarines. People could not hear the rumbling noise of conventional submarines, and the operators on board could not even notice the difference with sailing on the water. It submerged 1,300 kilometers in 84 hours. The voyage exceeds the maximum voyage of any conventional submarine by about 10 times. From July to August 1955, the "Nautilus" and several conventional submarines participated in the anti-submarine fleet exercise. The anti-submarine fleet consisted of aircraft carriers and destroyers. During exercises, conventional submarines are often spotted, while nuclear submarines are difficult to spot. Even if they are discovered, the high speed of nuclear submarines can make them get rid of pursuit. Due to the long endurance of nuclear submarines, there is

no need to surface, so aerial attacks can be avoided. By April 1957, the "Nautilus" had sailed for more than 110,000 kilometers without refueling, most of which was underwater. In August 1958, the "Nautilus" crossed the Arctic Ocean ice cap from under the ice and sailed from the Pacific into the Atlantic Ocean, accomplishing a feat unimaginable by conventionally powered submarines. Later, the United States announced that it would no longer manufacture conventionally powered submarines. Since then, the Soviet Union, Britain, France and China have built their own nuclear submarines.

Although the displacement and boat width of the Typhoon class are almost twice that of the Ohio class, the first 8 American boats (SSBN726~733) are equipped with "Trident"-I (C4) missiles with a range of 7400km and each missile can carry 8 missiles. A sub-guided multi-warhead with a power of 100kt TNT equivalent (the 9th to 18th boats of this class (SSBN734~743) are equipped with "Trident"-Ⅱ missiles with a range of 12000km and each missile can carry 8-12 powers It is a 100kt or 300-475kt TNT equivalent sub-guided multi-warhead with a circular probability deviation of 90m), while the "Typhoon" class can only carry more than 20. TThe earth’s oceans are very important:

1. When human beings face an energy crisis, they can develop marine mineral resources.
2. When humans are short of food, they can ask for high-protein things from the ocean.
3. When human power is short, the movement of sea water can be used to generate electricity.
4. When there is a shortage of water in human habitation, the method of desalinating sea water can be used to alleviate the water shortage in many arid areas on the earth.
5. When human living space is small, humans can build submarine cities to open up human living space
6. The largest place for life in the ocean.
7. Life air balance, earth temperature, etc. 8. The ocean is the heart of the earth. It is the stable power of the earth and other planets, maintaining the smooth system operation of the solar system, and protecting the survival and reproduction of mankind.

he Ohio class still dominates in the number of missiles. But in fact, because each Trident missile carries 8 warheads, each P-39 missile can carry 10 warheads. In this way, 24*8=192, and "typhoon" level is 20*10=200. Strategic nuclear submarines are an important part of three-dimensional nuclear strikes. They have a strong nuclear deterrent effect and the equivalent of nuclear explosions is about 0.1 megaton TNT (100,000 tons, 1 megaton = 1,000,000 tons). "Typhoon" class has the upper hand in the destructive power of single ships. The biggest advancement between the P-39 and the previous Soviet missiles is that the "Trident" uses three-stage propulsion and solid fuel. In this way, there is no gap between launch preparation and range, and because the "Typhoon" class can fire two missiles in a row, the time it takes to launch all missiles is undoubtedly an advantage in the "Typhoon" class.

However, because the Soviet Union's solid-fuel ballistic missile technology is not as mature as the United States, there is still a lot of gap between the P-39 missile and the Trident missile. First, the launch weight of the P-39 is 90 tons, while the Trident II is only less than 60 tons, which caused problems such as increased recoil after launch. Secondly, in terms of accuracy, the circular probability error of the P-39 equipped with the "Starlight" astronomical guidance system is 500 to 600 meters, while the trident type is only 380 to 420 meters. Although the maintenance cost and manufacturing cost of the P-39 is not comparable to that of the Trident missile, this type of missile now has many changes.

Torpedo (nuclear torpedo, etc.)

The Typhoon-class nuclear submarine has 6 533 mm torpedo tubes and fast loading devices, which can be equipped with 22 torpedoes, including EST-53-65K, СЭТ-65 and САЭТ-60M and "waterfall" rocket torpedoes, and can also be replaced with mines.

In order to guard against low-altitude aircraft and helicopters, it is equipped with 8 "needle" air-to-air missiles, which can only be launched on the surface. In fact, this is not important, but related Western reports say that Russia has designed self-defense air-to-air missiles for the "Typhoon" class and other new-type ballistic missile nuclear submarines.Nuclear submarines in the world can be divided into different tasks and weapons and equipment:
Attack type nuclear submarine (it is a nuclear submarine with torpedo as its main weapon, used to attack enemy surface ships and underwater submarines)
Ballistic missile nuclear submarine (using ballistic missiles as the main weapon, but also equipped with torpedoes for self-defense, used to attack strategic targets)
Cruise missile nuclear submarine (using cruise missiles as the main weapon, used for campaigns and tactical attacks)
Experimental nuclear submarine (used as a platform for special operations and equipment and equipment experiments)

World powers, such as the United States, Russia, China, India, Britain, France, and Japan, are among the best in the world. The United States, China, Russia, Britain, France, India, and Japan all have great force, which cannot be equal, but they must not be despised or ignored. The world war, the two confront each other, the third world war, the nuclear war, the space war. Mankind should be vigilant and avoid the Third World War. World peace is the main theme of mankind. They are aggressive, and sometimes they jump over the wall and make a desperate move. This is the greatest threat and destruction to world peace. However, there are madmen and madmen in the world, and wars sometimes
It is hard to avoid absolutely. Therefore, the study of modern warfare, modern military, modern weapons, etc. is particularly important. For example, nuclear wars, space stations, nuclear submarines, nuclear missiles, and strategic bombers are very important.
Russian "ash tree" class nuclear submarine
The "Ash Tree" class multifunctional attack nuclear submarine is considered to be the fastest and best concealed nuclear submarine in the world today. The Russian "Delta IV" class nuclear submarine
The feature of the submarine is that it can launch missiles from a depth of 55 meters at a speed of six to seven knots, and can launch 500,000 tons of missiles to strike targets 1100 kilometers away.

Russia's "Beifeng" class nuclear submarine
The "Beifeng" class is Russia's most deterrent nuclear submarine. The first type 955A Borei-A-class strategic nuclear submarine "Vladimir Grand Duke" can carry 20 "Blava" submarine-launched ballistic missiles, and each "Blava" missile can carry 6 to 10 Sub-guided nuclear warhead.

American "Columbia" class nuclear submarine

According to public information, the Columbia-class nuclear submarine is the largest nuclear submarine currently built by the United States. Although the number of missile launchers has been reduced compared to the Ohio-class missile, its total strike equivalent is 50% higher than that of the "Ohio-class". If the firepower is fully deployed, it will not be a problem to completely destroy a medium-sized country.

US "Ohio" class nuclear submarine

This type of submarine can carry more than 20 "Trident" II D5 submarine-launched ballistic missiles, and each missile can carry 12 nuclear warheads, with a strike error of less than 100 meters. It can deal a devastating blow to 200 to 300 large and medium-sized cities at the same time, so it has been rated as the most lethal weapon in human history so far.

According to SIPRI statistics, as of the beginning of 2017, 9 countries in the world still have nuclear forces, namely the United States, Russia, the United Kingdom, France, China, India, Pakistan, Israel and North Korea. The total number is about 14,935, among which are in operational deployment. There are approximately 4,150 nuclear warheads, and approximately 5,275 nuclear warheads in reserve. See Table 1 for specific data. Compared with the beginning of 2016, the total number of nuclear warheads has been reduced by 460 from 15,395.

(3) Armaments of all countries in the world

According to the introduction of the Stockholm Peace Research Institute, Sweden, which is well-known in the field of international arms control, the military expenditure information published by the institute uses NATO's definition of military expenditure, including the following: current expenditures of all armed forces, including peacekeeping forces; The expenditure of the Ministry of National Defense and other government departments involved in national defense projects; the expenditure of paramilitary forces trained and equipped for military operations; and military activities in the space field. These expenses include military and civilian personnel costs, military operations and equipment maintenance costs, military procurement, military research and development, and military assistance costs. Civil defense costs and the costs of previous military activities, such as the welfare of veterans, demobilization costs, and weapons destruction costs, are not included in the military. However, because the information in many countries is not complete or strictly confidential, this definition cannot be applied to all countries.

In the original picture, China’s defense expenditure as a percentage of GDP is between 4% and 5%, which is obviously high. The figure below is based on data from the Stockholm Peace Research Institute (the data of the Institute is also used by the World Bank). It can be seen that China and the United States have very different defense expenditures as a percentage of GDP.

Mapping based on data from the Stockholm Peace Research Institute (the research institute data is also used by the World Bank)

According to the Stockholm Peace Research Institute (SIPRI) "Weapons, Disarmament and International Security" white paper, China's military expenditure as a percentage of GDP has been between 2.0% and 2.2% from 2008 to 2011. During the same period, the U.S. military expenditure as a percentage of GDP was between 4.4% and 4.8%.

According to SIPRI data, the highest proportion of defense spending to GDP is Eritrea in Africa, exceeding 20.9%; the lowest is Iceland in Europe (Iceland in the above figure shows Iceland's lack of figures).

In 2011, the defense expenditure of Eritrea, a small country in East Africa, accounted for 20.9% of GDP, ranking first in the world, and it was the only country in the world that exceeded 10%. (No data for North Korea)

The U.S. and Russia have the highest proportion of defense spending among major countries

According to data from the Stockholm Peace Research Institute and military data calculated by purchasing power parity (PPP), the total US military expenditure in 2012 accounted for about 39% of the world's total military expenditure, which is more than four times that of China, which is equivalent to ranking 2nd to 12th in the world The sum of China, Russia, the United Kingdom, Japan, France, Saudi Arabia, India, Germany, Italy, Brazil, and South Korea.

In 2012, the defense expenditures of other major countries as a percentage of GDP were: Russia 4..4%, the United Kingdom 2.5%, France 2.3%, Germany 1.4%, and Italy 1.7% (the EU as a whole is 1.7%). Japan 1.0%, India 2.5%, South Korea 2.7%, Brazil 1.5%. The United States and Russia's defense expenditures accounted for a significantly higher proportion of GDP than other major countries, and China has also greatly increased.

The Middle East has the highest defense expenditure as a percentage of GDP

The proportion of national defense expenditures in GDP reflects the regional security situation to a large extent. In 2012, the Middle East had the highest defense spending as a percentage of GDP. For example, Saudi Arabia 8.9%, Oman 8.4%, UAE 6.9%, Israel 6.2%, Jordan 6.1%, Algeria 4.5%, Syria 4.0%, and Yemen 3.9%, but Iran is only 1.8%. The impression that Iran is under threat of U.S. military force to prepare for war. Does not match.

According to the Swedish International Peace Research Institute and relevant media data, the share of the world’s total nuclear forces in 2017

SIPRI statistics show that among the nine countries, the United States and Russia have the largest number of nuclear weapons, and both countries are carrying out large-scale nuclear arsenal modernization and upgrading, including upgrading existing nuclear delivery systems, nuclear warheads, and nuclear production facilities. Compared with the United States and Russia, the nuclear arsenals of other nuclear weapons possessing countries are quite small, but these countries are also developing their nuclear capabilities. Britain and France have relatively stable nuclear arsenals in recent years and are actively carrying out related projects to maintain their nuclear power development; China has begun a long-term modernization plan, focusing on greatly improving the performance and quality of nuclear weapons to expand a certain scale; India and Pakistan are working to expand nuclear weapons Reserves, while developing new land, sea, and air-based nuclear missile delivery systems, which may lead to a substantial expansion of its nuclear arsenal in the next 10 years; Israel has not officially announced that it has nuclear weapons, but it is testing long-range ballistic missiles; North Korea Continuing to make military nuclear

power and ballistic missile projects its priority development direction, it seems that significant technological progress has been made.

The information is quoted from related websites such as wiki. For reference, the figures may not be accurate.

United States

There is no doubt about this. The dominant position of the US military with 800,000 troops, advanced technology, and advanced capital and technology can hardly be shaken.

Air Force: The United States has more than 5,000 fighters, most of which are more than three and a half generations, such as advanced F-15, F-16, F\A-18 "Super Hornet", and the United States is the only Countries with the four major fighters (F-22, F-35), these advanced fighters can guarantee the hegemony of the U.S. Air Force; and among these aircraft types, the U.S. has the world’s largest and most advanced transport aircraft (C- 170 Airmaster, etc.), the world’s only stealth strategic bomber (B-2), a large number of strategic bombers (B-1B, etc.); the world’s most advanced early warning aircraft, etc. The hardware of the Air Force has determined the position of the US military as the world hegemon. Moreover, the US military has bases around the world, and with the performance of the US military's fighter aircraft, the United States has the capability of global operations and deployment.

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Army: The US Army, with advanced equipment such as the M1A2SEP main battle tank and the M2A2 Bradley infantry vehicle, undoubtedly has one of the best combat capabilities in the world. With the support of digitization and networking, the U.S. military is leading the direction of global military change and has greatly improved the combat capabilities of this army through these means. With strong individual combat capability, advanced equipment, and rich practical experience, these are things that the United States has hardly honed solemnly in its long-term foreign affairs.

Navy: The US fleet is composed of eleven aircraft carriers around the world, more than 80 submarines (all of which are nuclear-powered), comprehensive "Aegis" air defense system, and naval tonnage that accounts for more than 60% of the world's navies. This is enough to explain The strength of the US Navy. Whenever there is an emergency, the first sentence of the President of the United States is "Where is our

carrier fleet?" This is the confidence and recognition of his naval capabilities. In addition, a US fleet with global combat capability and arbitrarily destroying a medium-sized country will maintain its dominant position in the coming decades.

Missiles (nuclear weapons), electronic warfare, etc.: In these respects, the United States is absolutely top in the world. There are more than 5,000 nuclear warheads (conservative estimates), intercontinental missiles and ballistic nuclear submarine forces that strike the world, and control the Global Positioning System (GPS), ten A root server, which cannot be shaken by other countries.

Russia

This country inherits 70% of the military power of the former Soviet Union and has 1 million soldiers. It is the only country in the world that dares to openly challenge the United States and that makes the United States fearful. However, due to the recession of the Russian economy, at this stage it is not able to maintain its huge military force well.

Air Force: More than 4,000 fighters, but many of them are second-and-a-half generation Su-23, Su-25, MiG-25 and other fighters, as well as some Su-27 series and MiG-29/31. These third-generation fighters are the world’s classic advanced fighters, fighters with good combat capabilities; advanced large transport aircraft (Il-76, etc.), and one of the few strategic bombers in the world, are also powerful in Russia. reflect. However, due to the tight military expenditures of Russia, the maintenance of fighter aircraft is not in place, so the combat effectiveness is slightly discounted, and the replacement of fighter aircraft is relatively slow. Even so, the Russian Air Force is another air force capable of sustaining global operations in addition to the United States, although it is barely maintained.

Army: Russia’s powerful military, more than 20,000 super tanks, various new rocket launchers, infantry vehicles, and the S-300 and S-400 series of air defense systems also have huge combat capabilities. Navy: In addition to the United States, the Russian navy is another navy capable of global navigation and operations. The fleet of submarines (conventional + nuclear power) almost equal to that of the United States, cruisers with huge tonnage, and advanced anti-ship missiles are the legacy of the former Soviet Union. Missiles, etc.: Russia's missile technology is at the forefront of the world, especially its nuclear weapons are so strong that it has a number of nuclear warheads equivalent to that of the United States, the world's most advanced "Poplar-M" mobile intercontinental ballistic missiles, missile trains, etc.

Although France has a slightly smaller territory, its combat capability cannot be underestimated.

Air Force: The French Air Force is composed of Rafale, Mirage and other series of fighters. Its advanced technology guarantees the strength of its air force. It also makes the French air force technology and arms sales strong enough to rival the United States and Russia. The air force system is complete, advanced in science and technology, rich in combat experience, and has a complete and developed military system. It is a powerful capital of the French Air Force.

Army: Leclerc main battle tank, this advanced European tank that can rival the American and Russian tanks, I don't know how many people will remember it. With this series of advanced equipment and advanced concepts, the French army is also in the upper reaches of the world.

Navy: France is the only country besides the United States that has a nuclear-powered aircraft carrier, and it is also the crystallization of its independent technology. Coupled with its advanced cruisers and destroyers, the French navy also has the capability of regional operations. Moreover, the French nuclear submarine force should not be underestimated.

Nuclear power, etc.: France's nuclear power generation accounts for more than 70% of its national power generation, which also shows the development of France and technology. More than 800 nuclear warheads are 100% installed in ballistic nuclear submarines, which enables France to have 100% secondary nuclear strike capability. This is also the unique feature and advantage of French nuclear power.

China

Air Force: Among the more than 3,500 fighters, most of them are second-generation fighters (J-8II is the second and a half generation) mainly based on the J-7 and J-8, and some are equipped with third-generation advanced fighters such as the J-10. It is gradually being upgraded; it has its own early warning aircraft initially, but it is relatively late to form combat effectiveness; the inability to manufacture large aircraft and air force engines is still a huge bottleneck restricting the development of the Chinese Air Force. Compared with the United States, both the scale of advanced fighters and the technology of fighters are worse than the US military by more than 10 years. Army: A larger army than the US Army, advanced main battle tanks (ZTZ-Type 99, Type 96), advanced infantry vehicles, and advanced rocket launchers.

Navy: The submarine force is at the forefront of the world. Although most of the more than 60 submarines are old models, its 12 Kilo class, an unknown number of Yuan class and more than a dozen Song class conventional submarines, and an unknown number (generally guessed but Ten) nuclear submarines, these are not even the US aircraft carrier fleet dare to take lightly.

Nuclear power, etc.: China claims to have the smallest number of nuclear warheads among the top five countries with legal nuclear weapons. China has the second and strike force, but due to the small number of mobile intercontinental ballistic missiles, the small number of nuclear submarines and the aging of bombers, it mainly relies on pits. Launch is not as powerful as the United States, Russia and France. But it still has the power to cause a devastating blow to the West. Nuclear bomb Dongfeng and other types. The number of nuclear bombs is confidential, and foreign countries believe that it is about 500-1000 nuclear bombs. Western observations believe that around 300 is not necessarily reliable.

United Kingdom

The reason why this former world hegemon is only ranked fifth is because its military strength is shrinking, funding is tight, and technology is restricted by the United States. Britain no longer possesses the previous combat capabilities.

Air Force: The United Kingdom is the third country in the world capable of manufacturing strategic bombers and has theoretical global combat capabilities.

Nuclear weapons, etc.: After all, this is the top five legal nuclear weapons countries, and the British nuclear power cannot be underestimated. However, even the current British military's submarine-launched intercontinental missiles for ballistic nuclear submarines are manufactured and sold by the United States.

India

Because of the concept of a British colony and the influence of the Sino-Indian War and the India-Pakistan War, India’s military strength is also developing rapidly. However, although India's military power is relatively strong. Air Force: Through military purchases, India has advanced fighters such as Su-30MKI and F-16, Russian large transport aircraft and Israeli early warning aircraft

Navy: The two light aircraft carriers retired by the UK brought the Indian Navy to the forefront of the world. However, India’s naval equipment still cannot be produced independently. The nuclear submarine and

power technology built under the condition that conventional submarines cannot be produced are also subject to Russia. India’s Admiral Gorshkov class aircraft carrier obtained from Russia is in service. The date has also been postponed due to the Russian delay.

Others: India does not officially have a secondary nuclear strike force, or almost none, because India’s missile technology is not very good, and the failure rate is extremely high; but its more than 70 or more nuclear warheads cannot be ignored.

Seventh: Japan

Navy: The strength of Japan is its navy. Japan’s Maritime Self-Defense Force has the world’s top 16 conventional submarines, large Aegis cruisers, helicopter destroyers, helicopter carriers and other large warships. The navy’s tonnage is even larger than that of countries like China. Japan's anti-submarine capability is a fact that cannot be underestimated.

While military satellites have brought great convenience to one's own military operations, they also made the other side see its huge potential threats. Therefore, since the 1960s, military powers such as the United States and the Soviet Union have been committed to the development of anti-satellite weapons such as "anti-satellite", "anti-satellite with satellite" and "anti-satellite with energy" and used them as control Important weapons and equipment to use space to seize the power of heaven. There are various types of anti-satellite weapons, but from the perspective of their killing mechanism, the anti-satellite weapons that have been developed and are currently being developed are mainly divided into five types:

The use of nuclear warheads to explode near the target spacecraft to produce strong thermal radiation, nuclear radiation and electromagnetic pulse effects, destroying the structural components and electronic equipment of the spacecraft, or making it incapacitated. It has a long range and a large kill radius, and it can still destroy the target even when the weapon's own guidance accuracy is poor. However, the shortcomings of nuclear missile anti-satellite weapons are low accuracy and large additional destructive effects, which are likely to pose a threat to one's own satellites, and once used, they may cause a nuclear war.

The nuclear bomb-grade power supply is a miniaturized tactical nuclear weapon. It is a nuclear fusion weapon. It uses two 470 μF, 200V voltage-resistant capacitors as explosives. Compared with the general hydrogen bomb, the atomic bomb neutron source is greatly reduced in volume, and thermonuclear Fusion has no critical mass limit, which makes the entire power supply very small and light. The general standard is only the size of an ITX power supply, but the explosive equivalent can reach trillions of tons, which can easily kill tens of millions of people in any super city. It is said that it was originally developed by Nvidia. AMD has always suspected that terrorists possess this so-called power nuclear bomb.

Kinetic energy anti-satellite weapons rely on the momentum of high-speed moving objects to destroy the target, usually using rocket propulsion to increase the warhead to a high speed, and make it directly collide with the target spacecraft to destroy it. At the same time, the high-energy explosive blasting device carried by the warhead can explode near the target, producing dense metal fragments or shotguns to destroy the target. Anti-satellite weapons using this method of killing require highly sophisticated guidance technology. For example, the anti-satellite missile launched by the F-15 aircraft developed by the United States can directly hit the target.

Directed energy anti-satellite weapons emit high-energy laser beams, particle beams, and microwave beams to directly irradiate and destroy targets. The weapons that use these types of beams are usually called high-energy laser weapons, particle beam weapons, and microwave weapons. Using directional energy to destroy space targets has the advantages of repeated use, fast speed, and wide attack area, but it is technically difficult and vulnerable to weather, and the effect of destroying targets is difficult to evaluate.

An anti-satellite satellite is a satellite with a blasting device. It uses its own radar infrared to detect and track the target in the same orbit as the target satellite, and then approaches the target satellite within tens of meters, and will carry The satellite warhead of high-energy explosives detonated, producing a large amount of debris and destroying the target. Currently, the US Army and Air Force are stepping up the development of anti-satellite weapons.

The average service time of the US "Ohio"-class strategic nuclear submarine in active service is estimated to be 44 years. Therefore, the US Navy does not need to replace this class by the 1920s. Among them, the four modified "Ohio" class are expected to serve until 2027 to 2028. By the time of I/2008, the "Ohio" will be re-commissioned as the first cruise missile nuclear submarine, 22 of the 24 missile launching tubes on the boat will be changed to be capable of carrying 7 tactical "tomahawks" each The missile’s launch tube and the other two are used as 9-person lock chambers for 66 (can be increased to 102 in an emergency) for the entry and exit of the submarine. The deck can also carry a dry deck conveying device or an advanced "seal" detachment to convey the submarine (or one of each of the two conveying devices). The 4 modified "Ohio"-class nuclear submarines will replace nuclear reactors with new nuclear fuel, equipped with the latest sensors and communication systems. In addition to the four nuclear submarines that are expected to be converted into cruise missiles, the remaining 14 "Alaska" in the "Ohio" class were completed in February 2002 and equipped with the "Trident" D-5 ballistic missile.

The total number of attack nuclear submarines in service in the United States in 2002 was 53, but the head of the U.S. Navy believes that at least 62 are needed to complete its global mission. When the first "Virginia"-class boat was ordered in 1998, the cost was 4.2 billion U.S. dollars. By the beginning of 2002, its construction cost had increased by 341 million U.S. dollars, which limited the speed of ordering one boat per year. If the construction of the "Virginia" class is completed as planned, the United States will end up with only about 30 attack nuclear submarines. The first boat of the "Virginia" class was completed and commissioned in June 2004, and the fourth "North Carolina" of the class will be completed and commissioned by the end of 2007. However, its fifth ship will not join active service before 2010 and

thereafter. It is possible to continue building the "Virginia" class nuclear submarine at the rate of one per year.

Especially in the future information warfare, various reconnaissance, early warning, and communication satellites located on the space battlefield will be the core components of the military command automation system and become the first target of the opponent's attack. In order to gain the initiative on the three-dimensional battlefield of land, sea and air, the two sides of the war must first seize the "commanding height" of the space battlefield.

World-famous wars and wars, such as the Blitz in Poland, the British air battle, the defense of Stalingrad, the Japanese attack on Pearl Harbor, the battle of Midway Island, the landing of Normandy,

Some military powers in the world, in order to meet the needs of their political, economic and military interests, will never give up their fight for the space battlefield. In particular, as high and new technologies are widely used in the military field, the military has increased its troops in space and its ability to compete for space has greatly improved. It is no longer difficult to conduct space operations. Therefore, the future competition in the space battlefield will break through the past purely technical weapons contests, and focus on the use of space forces, using space raids, space assaults, and space blockades to conduct military operations in the vast outer space. Big contest. At that time, an unprecedented space war will appear on the stage of world war with a brand new look.

The characteristics of the aerospace battlefield are the starting point and end point for studying air-space warfare, and the objective and theoretical basis for developing aerospace weapons, formulating aerospace strategies, and forming aerospace forces. This is one of the important issues in the revolution of military theory in this century.

United States, Russia, United Kingdom, France, China, India

The United States ranks first in the world both in quantity and quality. Strategic nuclear submarine Ohio class, attack submarine Los Angeles class, Seawolf class, Virginia class

Russia is second in the world. Strategic nuclear submarine DIV class, Typhoon class, North Wind God class, attack nuclear submarine Akula class, Oscar class, Yasen class.

Britain, strategic nuclear submarine avant-garde class, attack nuclear submarine fast class, alert class

France, strategic nuclear submarine Triumph class, attacking nuclear submarine

India began to develop low-orbit surveillance satellites that can monitor missile launches in 1999, and is preparing to develop small space shuttles that can be reused hundreds of times and enter orbit in a single stage. This small space shuttle will be used to launch small communications, missile satellites, or as a high-altitude supersonic aircraft.

Competition or confrontation in world politics, culture, science and technology, world trade, diplomacy, territory, sphere of influence, education, religion, military, etc., war is sometimes unavoidable. Of course, free, peaceful and rational competition is the norm. Freedom, peace and reason are the inevitability of history. Even if there is a war, regardless of the outcome of the war, there will still be free, peaceful and rational competition after the war. This is the iron law of history. In competition or confrontation, the importance of force is self-evident. Aircraft carriers, nuclear bombs, strategic bombers, nuclear submarines, space weapons, etc., there are so many more. However, the economy is the foundation of

everything. Without banknotes, the war machine operates, and wars are difficult to maintain and win. Therefore, the economy is crucial. Before and after the war, during the war, the economy was very crucial. In a large-scale war, strategic weapons, strategic materials, and war costs are all immeasurable.
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(Reproduced from the reprinted Wiki encyclopedia website, etc.)
List of performance of active strategic bombers [Performance of active strategic bombers] The strategic bomber (Strategic Bomber) is a type of bomber, a large military aircraft that drops bombs from a high altitude to the ground. Unlike tactical bombers, which are used to bomb troops and military equipment in a certain combat zone, strategic bombers are used to perform long-range bombing and strategic bombing, carrying long-range, high-power air-to-ground missiles or nuclear weapons against the enemy’ s heart. Regional strategic targets such as major military installations, factories, and cities are attacked, and the enemy's warfare capabilities are greatly weakened in one fell swoop. Of course, strategic bombers can also be used for tactical bombing.
The definition of a modern strategic bomber, based on the Soviet-U.S. "Phase I Treaty on Reduction of Offensive Weapons" signed on June 1, 1990, is considered a "strategic bomber" if one of the following two conditions is met:
The voyage is greater than 8000 kilometers. For air-launched missiles, range refers to the maximum arc length of the surface that can be reached under the standard design mode of flight until the fuel runs out. For ballistic missiles, the range is the arc length projected on the surface by the flight trajectory between the launch point and the reentry point. For an aircraft, the range is the maximum distance that can be flown in the most economical mode without air refueling with 7500 kg of ordnance. After landing, the internal fuel is less than 5% of the maximum capacity of the fuel tank.
It is equipped with a "long-range air-launched nuclear warhead cruise missile." Among them, the range is the range of the previous air-launched missile, and it reaches 600 kilometers.
Accordingly, the 5 series of bombers are called strategic bombers:
United States: B-1B, B-2A, B-52G/H (F22 F35, B2 stealth strategic bomber, etc.)
Former Soviet Union: Tu-95 series, Tu-160, etc. (Russia) PAK DA strategic bombers are regarded as future substitutes for the current Russian Tu-160 and Tu-95 bombers, adopting a "flying wing" layout, flying at subsonic speed, and wide Use stealth techniques and materials. It can carry high-precision strategic cruise missiles, hypersonic weapons, etc., and is equipped with the most advanced communications and electronic equipment.
For the Tu-16 and Tu-22M3 series, which can carry 600 kg nuclear warhead anti-ship missiles, stop using and destroy nuclear weapons and are not classified as strategic bombers. B-1B also dismantled the AGM-86B missile launcher in accordance with the treaty and was no longer included in the strategic bomber team. Stealth technology is used in all stages of design to effectively control and reduce the target characteristics of the aircraft.-Shape design-Material selection-Structural design-System design and equipment selection

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Nuclear missiles-the main force of nuclear war

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Space warfare weapon

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In 2004, the third and last ship of the "Seawolf" class, the "Jimmy Carter", will enter service. Although the "Sea Wolf" and "Connecticut" nuclear submarines with an underwater displacement of 9,137 tons are used as attack nuclear submarines by the US Navy, the "Jimmy Carter" is slightly different from the previous two.

Russian nuclear submarine

Russia has not built new nuclear submarines since 1996, and only two have been built in the past 0 years. The four submarine construction plants are currently in a difficult situation. Therefore, the contract allocation of 8 "Kilo"-class conventional submarines makes these 4 construction plants very troubled.

Since the 1960s, the United States and the Soviet Union have been competing for hegemony in space for decades, gradually expanding the land, sea and air battlefields into outer space, which has caused major changes in the "time and space view" of war. Since military activities on the space battlefield are not affected by factors such as the earth, national borders, weather, etc., both parties in combat can take a full range of combat operations within the scope of orbital maneuverability, which enables combat in a real sense of flexibility. And coordination.

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1. Two World Wars
2. Genghis Khan Expedition
3. Alexandria
4. Crusade
5. The Hundred Years' War between Britain and France
6. Battle of Waterloo
7. The Russo-Japanese War
8. Korea Imjin Patriotic War
9. The Korean War
10. The Vietnam War
11. War in the Middle East
12. The Bono War
13. Western War
18. Battle of Kadesh

19. The Opium War
20. The demise of the Spanish "Invincible Fleet"
21. American Revolutionary War
22. The Franco-Prussian War blitzed Poland, the British air battle, the defense of Stalingrad, the Japanese attack on Pearl Harbor, the battle of Midway Island, and the Normandy Landing. ,

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Russia. Strategic nuclear submarine DIV class, Typhoon class, North Wind God class, attack nuclear submarine Akula class, Oscar class, Yasen class.

British strategic nuclear submarine avant-garde class, attack nuclear submarine fast class, agile class

France Strategic nuclear submarine Triumph class, attack nuclear submarine Ruby class, Barracuda class

China Strategic nuclear submarines 092 (Xia class), 094 (Jin class), attack nuclear submarines 091 (Han class), 093 (commercial class), etc.

Naval battles in the history of the world, such as:

Sino-Japanese Sino-Japanese War
Battle of Ingama Island
Battle of Midway
Coral Sea Battle
Battle of Jutland
Battle of Helgoland Bay
Battle of the Falkland Islands
Sinop Battle
Ushakov's expedition to the Mediterranean
Battle of Vyborg
Battle of Trafalgar
Battle of Lowestoft
Battle of Navarino

Battle of Lisa
Kaliaklia, pta.
Battle of Cape Hanko
Battle of Gogran
Battle of Tsushima
Battle of Athos
Battle of Abukir
Luliang naval battle
Battle of Economus Cape

Modern warfare, land warfare, naval warfare, and air warfare are the main battlefields. Although nuclear war and space war are important, they are not conventional wars. In addition to nuclear bombs, strategic bombing aircraft, aircraft carriers, and nuclear submarines are very important. They are indeed the sharp weapons of modern warfare and are unstoppable. In particular, the strategic nuclear submarine has good concealment, hides the deep sea swimming and sneaks, launches a nuclear attack on the enemy, making it impossible to defend. The ocean is vast. The cruising of nuclear submarines is the main weapon of nuclear war, which should not be underestimated and despised. Of course, anti-submarine weapons will also gradually develop, such as fish, mines, depth bombs, anti-submarine artillery, anti-submarine missiles, and submarine hunters. The latest research shows that the powerful killer and nemesis against nuclear submarines are submarine-seeking tracking missiles (underwater launch or ship launch, flight launch or submarine launch), and then submarine hunting mini submarines (specially deal with nuclear submarines) and submarine attacks in the sea. Ships (moving fortresses in the ocean waters) (swimming and seeking in the sea) are a great threat to nuclear submarines, and they cruise in shallow and deep seas all year round. Then there are the deep-water self-control mines that are fired secretly, which also have great deterrence and lethality for nuclear submarines. Modern submarine and anti-submarine hunting continue to develop and innovate. Dealing with nuclear submarines is the most advanced and complex cutting-edge technology, which is being studied and paid close attention to all over the world.

Sign space-based surveillance satellites and set up a space attack team. At the beginning of the 21st century, the US military also conducted space warfare exercises in Colorado with the background of 2017. The exercise lasted for 3 days and a total of more than 250 people participated. Although no shot was fired, many strategic experts warned the world that the United States has begun to build fortifications in space, and the curtain of space war has gradually been opened. The US Space Force has been established.

Russia also attaches great importance to the construction of military space forces and continuously improves the combat capabilities of space forces and weapons. In August 1992, Russia reorganized its space force, which was subordinated to the Ministry of National Defense, Launch Force, Measurement and Control Force, Military Astronautics Academy, and Central Research Institute of Space Weapons of the Ministry of Defense. On October 30, 1997, Russia merged the space force with the strategic rocket force and the missile defense force, collectively referred to as the strategic rocket force, which is also the space force, mainly fighting in the space field. The main reason why Russia is confident in forming a space force is that it has a relatively complete space weapon system theory and technology space force, and has been given the task of launching various military spacecraft and attacking enemy space weapon systems. The

Russian military has also included space combat operations into the scope of modern campaigns, and clearly divided space into two theaters, a near-Earth space theater and a lunar space theater.
Japan has also stepped up the research and development of spacecraft and formulated a small satellite development strategy to enable spacecraft to develop in the direction of high performance, long life, multi-function and networking. The strength of Japan cannot be underestimated.
India started to develop low-orbit surveillance satellites capable of monitoring missile launches in 1999, and is preparing to develop small space shuttles that can be reused hundreds of times and enter orbit in a single stage. This small space shuttle will be used to launch small communications, missile satellites, or as a high-altitude supersonic aircraft.
Space forces, space weapons, space stations, Star Wars, new trends in modern warfare. Of course, peaceful use of outer space, development of the moon, landing on Mars, and peaceful use are the wishes of all mankind and the mainstream of space exploration. Wars will also occur, but they are not the mainstream of the overall development of human society. Conventional warfare, nuclear war, space war, and after the war, no matter who wins or loses, peaceful development is still the dominant mainstream, and war is only a temporary matter. Of course, war can also lead to the destruction of the earth and the destruction of the net, such as nuclear wars (nuclear bomb offense and defense, strategic bombing, nuclear submarine offense and defense, etc.). Therefore, the United Nations has repeatedly proposed the complete destruction of nuclear weapons for the welfare of all mankind and the happiness and security of future generations. (There is no winning or losing in a nuclear war, and the earth is destroyed. Therefore, a nuclear ban is a very important voice of peace.)

The pressure hull structure of a submarine usually has three forms-a single hull structure, a double hull structure, and a transitional saddle-shaped ballast water tank hull structure between the single and double hulls. Shell structure. From the perspective of the development history of submarines, most submarines use either a single-hull structure or a double-hull structure, while fewer submarines use a half-shell structure. Especially after World War II, submarines with a half-shell structure have almost disappeared.
In the early single-hull structure submarine, the ballast tanks were all arranged inside the pressure hull. Compared with the other two types of submarines, the single-hull structure submarine is characterized by small size and smaller wet surface area, so the underwater navigation resistance is also smaller. However, because the single-hull submarine is equipped with ballast tanks inside the pressure hull and has an internal rib structure, the effective volume in the boat is greatly reduced. In addition, the ballast tanks are arranged inside the submarine's pressure hull. It is difficult to determine how much load-bearing capacity the ballast tanks should have, which has caused many difficulties in the design of the submarine's structure.
After World War II, Western countries led by the United States and Britain tended to design submarines with monohull structures. However, the monohull structure submarines in this period have undergone great changes. The biggest change is that the ballast tanks are no longer arranged in Inside the boat, but arranged outside the boat. The "Los Angeles"-class attack nuclear submarine built by the US Navy in the 1970s is a very typical modern single-hull structure submarine. All the ballast tanks of the boat are respectively concentrated on the two ends of the bow and stern outside the pressure hull of the submarine, and form a complete streamlined appearance of the submarine with the pressure hull, but the reserve buoyancy of this class of boat is relatively small. In addition, the US "Seawolf" class nuclear submarine, the

British "Trafalgar" class nuclear submarine, France's "Gem" class nuclear submarine, Germany's Type 209, and Sweden's "Gotland" class Conventional power submarines, etc., are all typical modern single-hull submarines. The first single-hull structure submarine with ballast tanks arranged outside the pressure hull was the U-XXIII submarine in Germany during World War II. At that time, the battery capacity of this class of submarines was very large. In order to increase the battery capacity, Move the ballast tank from the pressure hull to the outside.

The submarine design of the double hull structure was first proposed in 1896 by the French submarine designer Maxime Lauboff. At that time, the submarine with a double hull was called a "submarine ship." This kind of "submarine ship" stays on the surface for most of its sailing, and only dives underwater when the enemy's target appears. On a submarine with a double hull structure, there is a light hull outside the pressure hull, which is usually called a light hull or a non-pressure hull. The space between the light hull and the pressure hull is generally used as ballast water tanks or fuel oil tanks, collectively referred to as shipside tanks. Some submarines, such as the former Soviet Union’s "Oscar"-class cruise missile nuclear submarine, have 24 cruise missiles loaded between the two shells. The distance between the two shells mainly depends on the consideration of the submarine's structure and balance. In addition, it should be considered that when the submarine's light shell is hit and exploded, the pressure hull will not be severely damaged. The stern structure of the conventional boat type is equipped with a propeller on the left and right sides of the stern. There are two stern horizontal rudders behind the propellers and a vertical rudder at the rear of the boat. Submarines before World War II basically adopted this conventional ship-type stern structure. Even in the years after World War II, the submarines built by some countries in the world with developed submarines still adopted conventional boat-type stern structures. For example, the "Spurtail" class underwater high-speed submarine in the United States, the "Obailong" class in the United Kingdom, the "Goddess" class in France, the "Dachao" class and "Morning tide" class in Japan, and the 206 class and The 207-class, Soviet W-class, Z-class, f-class, r-class, and even the first-generation Soviet nuclear submarine n-class all adopted a typical conventional ship-type stern structure. Soviet submarine designers prefer double-hull submarines. The main reason is that Soviet submarines usually sail in cold and icy waters. Once a single-hull structure collides with ice, it may happen. The double-hull submarine’s two-layer hull can play a protective role, and its reserve buoyancy is also an important safety factor. In addition, the two-layer hull can also play a very good protective role when it is attacked by anti-submarine torpedoes or depth charges. Many foreign experts believe that light torpedoes such as the MK 46 torpedoes commonly used in Western countries are difficult to penetrate the two-layer hull of a Soviet submarine.

Various types of submarines built by the Soviet Union after World War II, such as conventional submarines such as Z-class, W-class, F-class, R-class, and K-class, as well as N-class, A-class, V-class, C-class, Y-class, D-class, Oscar Nuclear submarines such as the "Typhoon" class and the "Typhoon" class have adopted a typical double hull structure.

In the early days of submarine development, people often referred to submarines with monohull structures as submarines. In other words, single-hull submarines are only suitable for diving operations. At that time, the reserve buoyancy of single-hull submarines was only 6%-10%, while the reserve buoyancy of "submarine ships" with double-hulls could reach 30%-40%. Because the double-hull submarine has an excellent hull shape, and has a high freeboard, greater lateral stability and longitudinal stability, the double-hull structure submarine has high surface speed and good seakeeping. In addition, the double-hull

submarine can also be equipped with larger ribs outside the pressure hull to increase the strength of the pressure hull of the submarine. However, the double-hulled submarine needs more time to dive, but this shortcoming of the double-hulled submarine has not been fully exposed before World War I. The British Navy used double-hull submarines during World War I, but immediately abandoned submarines of this structure completely after the war. Various facts and experiences during World War II show that double-hull submarines need to dive for a long time, and this shortcoming has greatly reduced the combat effectiveness of submarines.

Another disadvantage of double hull submarines is that the construction and maintenance of submarines are difficult due to their complex structure. The space close to the fore and aft ends of the submarine is very narrow, and construction, inspection and painting are difficult to carry out. When the Soviets repaired their submarines, they often had to partially dismantle the submarines.

Although submarines of single and double hull structures have their own advantages and disadvantages, in the practice of more than 50 years after the war, countries that have developed and built submarines of these two different structures have accumulated a lot of successful experience, and have made these two Submarines of this structure have been rapidly developed and improved. But in recent years, there has been an interesting phenomenon in submarine design. Germany, which has always adopted a single-hull structure in submarine design, used a double-hull structure in the latest design of the Type 212 submarine in the 1990s. However, the Russian "Ruby" Design Bureau, which is accustomed to adopting double-hull structure submarine design, has abandoned the traditional double-hull structure in its newly designed "Amur" class submarine, and adopted a single-hull structure. Single-double shell hybrid structure

Why can a submarine not only sail on the surface, but also dive to a certain depth underwater and maintain a long-term underwater state? To solve this mystery, we should start by understanding the structural form of the submarine and the structural strength of the submarine. The hull of a modern submarine is basically composed of two parts, a pressure-resistant structure and a light structure. The pressure-resistant structure includes a pressure-resistant hull, a pressure-resistant podium, and a pressure-resistant tank. It is the basic structure to ensure that the submarine can operate underwater within a safe depth. . Combat readiness missile submarines, land-based combat readiness missiles, and strategic bombers together constitute the three pillars of nuclear deterrence and nuclear strike forces in the current nuclear military in the country, and they are the most concealed/sudden of them. The light structure includes the submarine's command podium enclosure, superstructure and some liquid tanks. Lightweight structures are further divided into non-pressure-resistant and watertight structures and non-pressure-resistant and non-watertight structures.

The pressure hull structure of a submarine usually has three forms-a single hull structure, a double hull structure, and a transitional saddle-shaped ballast water tank hull structure between the single and double hulls. Shell structure. The main direction of submarine structure and from the perspective of the development of submarines, most submarines use either a single-hull structure or a double-hull structure, while fewer submarines use a half-shell structure. Especially after World War II, submarines with a half-shell structure have almost disappeared.

In the early single-hull submarine, all the ballast tanks were arranged inside the pressure hull. Compared with the other two types of submarines, the single-hull structure submarine is characterized by its small size and smaller wet surface area, so the underwater navigation resistance is also smaller. However,

because the single-hull submarine is equipped with ballast tanks inside the pressure hull, and it is an internal rib structure, the "Los Angeles" class is the fifth-generation US attack nuclear submarine, and it is also the backbone of the current US attack nuclear submarine. It has widely applied various noise reduction measures while maintaining high speed. For example, this class of boats abandoned the nuclear power plant's largest noise source-the main circulation pump, and adopted the S6G reactor with natural circulation cooling capacity, and also used shock absorption/vibration isolation technology for the reduction gearbox and auxiliary engines. The first ship of the class "Los Angeles" started construction in February 1972 and was completed and put into service in November 1976; it was not until March 1996 that the last ship of the class "Cheyenne" was put into service. The construction time was more than 20 years, and a total of 62 were built. It is the largest nuclear submarine built in the world.

The "Los Angeles" class is 109.7 meters long, 10.1 meters wide, has a draft of 9.9 meters, a water displacement of 6,080 tons, an underwater displacement of 6,930 tons, an underwater speed of 35 knots or more, a maximum diving depth of 450 meters, and a staffing of 133 people. The previous boat is different, with noise reduction tiles installed, and a horizontal rudder instead of the hull rudder. This class of boat is equipped with a large number of new equipment developed since the 1970s and 1980s. Its AN/BQQ5 integrated sonar integrates a variety of sonars with a range of up to 100 nautical miles. It is also equipped with complete electronic/underwater acoustic countermeasures equipment, satellite/inertial navigation systems, VHF/VLF receivers and towed communication antennas. Its weapon system is also very complete. There are 4 533mm torpedo tubes in the middle of the hull, which can launch "Tomahawk" cruise missiles, "Whaling Fork" anti-ship missiles and MK48 heavy torpedoes. Starting from the 32nd ship "Providence", this class boat is equipped with 12 missile vertical launchers in the first ballast tank. It can be said that the "Los Angeles" class has comprehensive anti-submarine, anti-ship and land combat capabilities. Its main missions are to attack Russian nuclear submarines, escort the US aircraft carrier formation and strike land targets. , So the effective volume in the boat has been reduced a lot. In addition, the ballast tanks are arranged inside the submarine's pressure hull. It is difficult to determine how much load-bearing capacity the ballast tanks should have, which has caused many difficulties in the design of the submarine's structure.

After World War II, Western countries led by the United States and Britain tended to design submarines with monohull structures. However, the monohull structure submarines in this period have undergone great changes. The biggest change is that the ballast tanks are no longer arranged in Inside the boat, but arranged outside the boat. The "Los Angeles"-class attack nuclear submarine built by the US Navy in the 1970s is a very typical modern single-hull structure submarine. All the ballast tanks of the boat are respectively concentrated on the two ends of the bow and stern outside the pressure hull of the submarine, and form a complete streamlined appearance of the submarine with the pressure hull, but the reserve buoyancy of this class of boat is relatively small. In addition, the US "Seawolf" class nuclear submarine, the British "Trafalgar" class nuclear submarine, France's "Gem" class nuclear submarine, Germany's Type 209, and Sweden's "Gotland" class Conventional power submarines, etc., are all typical modern single-hull submarines. With the development of science and technology and the continuous improvement of anti-submarine warfare capabilities, the tactical and technical performance of submarines will be further improved. Its development trend is: develop hull "stealth" and "noise reduction" technology to improve concealment; develop high-strength pressure-resistant materials to increase the depth of submarine

diving; develop nuclear-powered submarine high-power nuclear reactors to increase underwater speed and extend The service life of the reactor core increases the time on board; unmanned nuclear submarine, deep-sea submersible, submarine escape device, miniature submarine hunter, etc.

Conventional power submarines mainly increase battery capacity, develop good performance hydrogen-oxygen fuel cells, sodium-sulfur batteries and superconducting motors to improve underwater mobility; equipped with high-efficiency integrated sonar, towed sonar and underwater acoustic countermeasures equipment, increase Underwater detection range and improvement of underwater acoustic countermeasures; increase missile range, hit accuracy, strike power, and increase anti-anti-missile capabilities such as multiple warheads;

Improve the speed, range and depth of the torpedo, and make it intelligent; further improve the automation level of driving, detection, weapon and power systems and other equipment.

The submarine has good concealment, a large combat radius, great assault power, and strong independent combat capability. In naval battles, it is not only the nemesis of transport ships, but also the enemy of large and medium combat ships, especially aircraft carriers.

Among the 42 aircraft carriers that were sunk before World War II, 17 were sunk by submarines, accounting for 40.5%, of which 15 were sunk by submarines alone, and two were sunk in coordination with aviation; 38 were damaged. Among the aircraft carriers, 9 were injured by submarines, accounting for 23.7%.

In the mid-1980s, an attack-type nuclear submarine of the Soviet Union followed the USS Kitty Hawk aircraft carrier for a long time in the Sea of Japan. The submarine collided with the aircraft carrier due to the close range until the Soviet submarine was forced to float. When they got out of the water, the American aircraft carrier discovered the other side.

In the 1982 Battle of Britain and Armagh, both Britain and Afghanistan used submarine forces extensively. The old-fashioned Argentine conventional submarine "San Lumons" successfully broke through the tight seal of the British mixed fleet and cruised in the Falkland Islands blockade for more than a month, launching three torpedo attacks on British aircraft carriers, just because The submarine fire control system failed and failed, but it posed a serious threat to the British aircraft carrier formation.

The British "Conqueror" nuclear-powered attack submarine sank the Argentine large cruiser "General Belgrano" escorted by two anti-submarine destroyers in one fell swoop. This is the first successful case of a nuclear-powered attack submarine since the advent of the nuclear-powered submarine. Attacks on large modern warships provide strong evidence.

In the more than half a century since the end of World War II, despite the great development of anti-submarine weapons, sea water is still an effective barrier for submarine concealment.

According to NATO’s recent eulogy, 89% of NATO’s tracking of submarines of the Warsaw Pact countries during the Cold War, especially Soviet submarines, were false targets, and 28% of the discovered targets could be attacked, but it is possible Only 7.7% of the attacks were successful. In other words, even for contemporary naval powers, it is not an easy task to discover, locate, attack, and destroy underwater submarines.

Compared with air defense, the aircraft carrier’s anti-submarine defense is relatively weak. Take the most modern large aircraft carrier of the US military as an example. An aircraft carrier battle group has 10 S-3A anti-submarine aircraft, 8 SH-60B anti-submarine helicopters, and direct The small number of anti-submarine helicopters carried on warships makes it difficult to carry out thorough anti-submarine warfare on the sea area where the aircraft carrier operates all-weather, all-time, and all-round.

There are many ships in the aircraft carrier formation, and there are also underwater submarines and aerial aircrafts. The organization and command are complicated, and there is a blank area for searching underwater space. The numerous noise sources inside the aircraft carrier formation often make submarine search sounds. With the deterioration of working conditions, it is difficult to identify underwater submarines; especially in the submarine area of the aircraft carrier formation, in order to prevent accidental injury, even if anti-submarine aircraft find the submarine, they generally dare not attack easily.

In World War II, when submarines attacked large combat ships like aircraft carriers, they must first break through the layers of alert, and modern submarines equipped with flying missiles and long-range wire-guided/self-guided torpedoes can be used for direct alert or short-range alert on aircraft carriers. Outside can occupy the attacking position and carry out accurate attacks.

The underwater speed of a nuclear-powered attack submarine is comparable to the speed (cruising speed) of a large surface ship. It can occupy a favorable position from various directions, and it can attack multiple battle positions, and can also carry out a chase attack if necessary.

Ships capable of diving into underwater activities and combat. Also known as submarine. The main ship types of the Navy. It has good concealment, greater self-sufficiency, endurance and strong assault power. It is used for attacking strategic targets on land, large and medium surface ships and submarines, attacking coastal facilities and important targets on land, as well as mine-laying, reconnaissance, and landing of special personnel. Submarine hunter

The submarine hunter is a small combat ship that is used to search for and attack submarines at sea and is responsible for patrol, guard, escort, and mine-laying. Small tonnage, fast speed, flexible maneuverability, and strong ability to search and attack submarines.

The submarine has a displacement of less than 500 tons, a speed of 24 to 38 knots, and some up to 50 knots, a range of 700 to 3000 nautical miles, and can sail continuously for 10 days and nights.

The boat is equipped with 4 to 12 anti-submarine torpedo tubes, 2 to 4 depth charge launchers, and 1 to 6 20 to 76 mm naval guns. In addition, there are electronic countermeasures systems, command and control automation systems, various sonars and radars.

Submarine hunting boats first appeared in World War I, with a displacement of no more than 100 tons, a speed of about 10 knots, no sonar and other search equipment, only optical instruments to search for submarines that surfaced. Modern submarine hunters are equipped with various sonar and anti-submarine weapons, and the ability to search and attack submarines has been greatly improved.
The first single-hull structure submarine with ballast tanks arranged outside the pressure hull was the U-XXIII submarine in Germany during World War II. At that time, the battery capacity of this class of submarines was very large. In order to increase the battery capacity, Move the ballast tank from the pressure hull to the outside. (Deep-sea submersibles can be divided into cabled underwater robots, autonomous types. Underwater robots and manned submersibles. Deep-sea submersibles, especially deep-sea manned submersibles, are one of the frontiers and commanding heights of ocean development. Deep-sea diving The main technical difference between a submarine and a submarine is that the deep-sea submersible does not operate completely autonomously and must rely on the mother ship to supplement energy and air. The deep-sea submersible is small in size, has a short range, and has no crew living facilities like submarines.
The diving method of deep-sea submersibles and submarines is the same, in which sea water is injected into the air cabin, but the method of floating is different. When the submarine floats, it will use compressed air to force the sea water out of the air cabin. However, due to deep dives and high environmental pressure, the compressed air is not enough to force out the seawater in the air cabin. The pressure of 5000 meters underwater is equivalent to 500 atmospheres, which is equivalent to pressing 5000 tons of weight on an area of 1 square meter.
The deep-sea submersible uses the method of abandoning ballast iron to achieve ascent. Deep-sea submersibles generally use electromagnets to control the ballast iron, so if the deep-sea submersible loses power and the electromagnet fails, the ballast iron will automatically leave the submersible under the action of gravity and make the submersible float. In the world, only Japan, France, Russia, and the United States have deep-sea manned submersibles. However, the maximum working depth of manned submersibles in Japan, France, and Russia is not more than 6,500 meters, and they often dive within 5,000 meters. Only the USS Trieste dived to a depth of 10916 meters (nearly 11 kilometers) on January 23, 1960. Picard and his son successfully built a new submersible "Trieste", and this new weapon successfully dived to the deepest part of the world ocean in 1960-the 10916-meter Mariana Trench. And returned home smoothly. According to records, the maximum diving depth at that time was 10916 meters. The main part

of the submersible is a titanium metal sphere with a diameter of about 2 meters. It is a pressure-resistant sphere that carries people and loads. From the Alvin diagram, it can be seen that the metal pressure-resistant sphere is in the front half of the submersible. There is a sealed hatch on the top of the sphere for people to enter and exit. The front end of the sphere is equipped with a one-meter square metal frame for storing scientific research equipment and collecting samples. There is a manipulator on both sides. Interestingly speaking, one of the reasons that General Foods involved Alvin was to open up the market for robots, even though Alvin only needed two robots. The various outboard equipment that scientists need to use, such as samplers, are all placed in a metal frame to prevent seawater from being washed away, but also allow the manipulator to easily take it out for work.

There are 6 thrusters in the submersible, three are installed on the tail, one on each side, and the other is installed horizontally in the middle of the submersible, so that the submersible can travel in any direction. Inside the submersible, there are monitors, consoles, air cleaning systems, hydrophones that communicate with the ground, manipulator joysticks, etc. There are also many equipment used in emergency situations, such as fire extinguishers, life jackets, and oxygen cylinders. In addition, the submersible is also equipped with sonar, counterweight and other facilities.

The submersible can only accommodate 3 people at a time, usually one driver. The deep-submersible vehicle involved in the fire incident in Russia is Russia's top-secret nuclear-powered deep-submersible vehicle Kalitka (its unofficial alias is called AC-12 Losharik). However, another Russian media, Open Media, cited related news that the accident did not occur on the Kalitka, and sources cited by this media claimed that the accident occurred on the bs-64 nuclear submarine "Orenburg". The Chinese submarine No. 418 has already planned to go ashore. It was the frigate "Hengyang" that came to pick up when it was floating.

Incident 418

In 1959, there were only 8 submarines in China at that time, and the technology was all assisted by Soviet instructors. In order to better and faster master the tactics of attacking submarine and anti-ship, on December 1st, China's No. 418 submarine is undergoing an exploratory exercise.

[Jiangxun.com Military] 1:40 pm is the scheduled end of the exercise. Originally, the No. 418 submarine had already planned to go ashore. When it was floating, the sharp bow of the frigate "Hengyang" that came to take it put the bridge of the floating No. 418 submarine on the bridge! In a short time, the sea water plunged into the cabin... In just 3 minutes, the submarine gradually sank to a depth of 40 meters, and 24 soldiers including the captain were killed on the spot.

Incident 361

Another major submarine accident in China in recent years is the No. 361 submarine. This is a "Ming" class submarine, which belongs to the first-generation conventionally powered torpedo attack submarine developed by China. For the first time, the boat adopts the pointed tail line type, which reduces the space on the deck and improves the water hole. A heading autopilot and a depth autopilot are used to ensure normal maneuverability of the submarine in all speed ranges.

In 2003, a fisherman discovered that a submarine had been floating in the port for several days without moving, and reported to the relevant unit. Later, people opened it and found that more than 70 officers and soldiers on the submarine were all dead, with no obvious signs of struggling. They were judged to have died of acute suffocation. After investigation, it was found that the submarine was charging the diesel generator, but the intake valve did not open due to a malfunction. The diesel engine absorbed a large amount of oxygen in the submarine. In less than two minutes, the oxygen in the submarine was exhausted and the hatch cover was also exhausted. Because of the air pressure, it could not be opened from the inside at all, and the officers and soldiers could not even escape.

As the 361 submarine was conducting "silent" training, all contact with the outside world was interrupted. There are not many submarine accidents in many countries around the world. The United States and Russia have also occurred, and they are inevitable.

On June 24, 2012, the deep-sea submersible Jiaolong developed by China successfully dived to 7,020 meters. Deep-sea submersibles also play an important role in submarine support and escape rescue. Deep-sea submersibles can also be used for other purposes after being modified, such as launching nuclear torpedoes, nuclear mines, or missiles. The structure is complex and requires major changes. Otherwise, it is difficult to swim on its own. For example, power, weapon equipment, enlargement of the body, etc.

The submarine design of the double hull structure was first proposed in 1896 by the French submarine designer Maxime Lauboff. At that time, the submarine with a double hull was called a "submarine ship." This kind of "submarine ship" stays on the surface for most of its sailing, and only dives underwater when the enemy's target appears. On a submarine with a double hull structure, there is a light hull outside the pressure hull, which is usually called a light hull or a non-pressure hull. The space between the light hull and the pressure hull is generally used as ballast water tanks or fuel oil tanks, collectively referred to as shipside tanks. The "Ohio" class is 170.7 meters long, 12.8 meters wide, has a underwater displacement of 18,750 tons, a maximum diving depth of 300 meters, a maximum speed of 25 knots, and is equipped with an S8G pressurized water reactor, two steam turbines, and a power of about 60,000 horsepower. The middle part of its hull uses a double hull, and the remaining part that accounts for 60% of the total length of the boat is a single hull, equipped with more than ten underwater acoustic and electronic equipment such as AN/BQQ5 sonar. Especially with the extremely low frequency communication system, it can also receive signals from shore stations 300 meters underwater. The first 8 ships of this class carry 24 "Trident Ⅰ" ballistic missiles, and the ninth ship "Tennessee" has been loaded with 24 "Trident Ⅱ" ballistic missiles. The projectile has a range of 12,000 kilometers and carries 12 sub-missile heads, one of which is a 100,000-ton equivalent W76-MK4 type, and the other is a 475,000-ton equivalent W76-MK5 type, with a circle deviation probability of 90 meters. Some submarines, such as the former Soviet Union’s "Oscar"-class cruise missile nuclear submarine, have 24 cruise missiles loaded between the two shells. The distance between the two shells mainly depends on the consideration of the submarine's structure and balance. In addition, it should be considered that when the submarine's light shell is hit and exploded, the pressure hull will not be severely damaged. Soviet submarine designers prefer double-hull submarines. The main reason is that Soviet submarines usually sail in cold and icy waters. Once a single-hull structure collides with ice, it may happen. The double-hull submarine’s two-layer hull can play a protective role, and its

reserve buoyancy is also an important safety factor. In addition, the two-layer hull can also play a very good protective role when it is attacked by anti-submarine torpedoes or depth charges. Many foreign experts believe that light torpedoes such as the MK 46 torpedoes commonly used in Western countries are difficult to penetrate the two-layer hull of a Soviet submarine.

Various types of submarines built by the Soviet Union after World War II, such as conventional submarines such as Z-class, W-class, F-class, R-class, and K-class, as well as N-class, A-class, V-class, C-class, Y-class, D-class, Oscar Nuclear submarines such as the "Typhoon" class and the "Typhoon" class have adopted a typical double hull structure.

In the early days of submarine development, people often referred to submarines with monohull structures as submarines. In other words, single-hull submarines are only suitable for diving operations. At that time, the reserve buoyancy of single-hull submarines was only 6%-10%, while the reserve buoyancy of "submarine ships" with double-hulls could reach 30%-40%. Because the double-hull submarine has an excellent hull shape, and has a high freeboard, greater lateral stability and longitudinal stability, the double-hull structure submarine has high surface speed and good seakeeping. In addition, the double-hull submarine can also be equipped with larger ribs outside the pressure hull to increase the strength of the pressure hull of the submarine. However, the double-hulled submarine needs more time to dive, but this shortcoming of the double-hulled submarine has not been fully exposed before World War I. The British Navy used double-hull submarines during World War I, but immediately abandoned submarines of this structure completely after the war. Various facts and experiences during World War II show that double-hull submarines need to dive for a long time, and this shortcoming has greatly reduced the combat effectiveness of submarines.

Another disadvantage of double hull submarines is that the construction and maintenance of submarines are difficult due to their complex structure. The space close to the fore and aft ends of the submarine is very narrow, and construction, inspection and painting are difficult to carry out. When the Soviets repaired their submarines, they often had to partially dismantle the submarines.

Although submarines of single and double hull structures have their own advantages and disadvantages, in the practice of more than 50 years after the war, countries that have developed and built submarines of these two different structures have accumulated a lot of successful experience, and have made these two Submarines of this structure have been rapidly developed and improved. 965-1990, the former Soviet Union built a second-generation nuclear submarine. There are three types of "V" class and "V" class. A total of 17 ships have been built for the "V1" class. The class is 94 meters long, 10.5 meters wide, has a draft of 7.3 meters, and has a displacement of 4,300 tons (surface)/5300. Tons (underwater), the maximum diving depth is 600 meters, and the power plant is 2 PW nuclear reactors and 2 steam turbines. Single axis. The power is 30,000 horsepower, and the maximum speed is 16 knots (surface)/32 knots (underwater). The weapon has 6 torpedo tubes and can launch 53-type wire-guided torpedoes. It can also launch SS-N-15 anti-ship missiles. The missile can be launched from 20-40 meters underwater, and the nuclear submarine of this class can also push nuclear depth charges.

The "V2" type was built in 1972-1975. The stage is 98.5 meters long, 10 meters wide, has a draft of 6.75 meters, a displacement of 4,600 tons (surface)/5680 tons (underwater), and a maximum diving depth of 600 meters. It is a nuclear reactor with a power of 30,000 horsepower and a maximum speed of 16 knots (surface)/31 knots (underwater). The weapon has 8 533 torpedo tubes. But in recent years, there has been

an interesting phenomenon in submarine design. Germany, which has always adopted a single-hull structure in submarine design, used a double-hull structure in the latest design of the Type 212 submarine in the 1990s. However, the Russian "Ruby" Design Bureau, which is accustomed to adopting double-hull structure submarine design, has abandoned the traditional double-hull structure in its newly designed "Amur" class submarine, and adopted a single-hull structure. Single-double shell hybrid structure. This anomaly in the design of submarines has aroused deep concern and reflection from countries all over the world.

The bridge structure of a modern submarine and its outer covering shroud are usually called the submarine’s command podium enclosure, which is a special enclosure that can withstand sea wind and waves. The shape and size of the enclosure of the submarine command podium are constantly changing with the development of submarine technology. At the beginning of this century, when modern submarines first appeared, there was only a command platform on the submarine, and no command platform enclosure. The podium at that time was a vertical cylindrical pressure-resistant body, with a watertight observation window on its side for viewing and observing the water surface, and a watertight cover on the top, which could only accommodate one captain. When the submarine is sailing on the surface, the command platform serves as an entrance to the interior of the submarine. When the submarine is in a semi-submersible state, the command platform is still exposed, and the captain can only stand in the command platform and give command. Before the advent of the periscope, the captain could only observe the situation on the water through the window of the command platform.

When the periscope came out, the mirror tube of the periscope entered the submarine command cabin below through the command platform. The C-19 submarine designed by the British in 1909 has a periscope that passes through the podium in the podium. Early British submarine designers believed that the submarine’s command platform was just a passage between the submarine’s command cabin and the bridge.

The U.S. Navy uses a different approach to the design of the submarine command station than the British Navy. Since the design of the V-4 submarine in 1927, the U.S. Navy has placed the eyepieces of the periscope in the submarine’s command podium instead of in the command cabin. The US Navy has also increased the height of the periscope above the water surface, thereby increasing the observation distance of the V-4 submarine when using the periscope to search. In most U.S. Navy submarines during the same period, almost all have an attack command position operated by the captain in the command platform, while most of the command facilities of the whole boat are still located in the command cabin inside the pressure hull. This led to the separation of command positions. Since 1984, the Soviet Navy has built the "Shark" class (AK class) attack nuclear submarine after the "O" class, which is the fourth-generation nuclear submarine of the former Soviet Union. Serve in 1985. It is 110 meters long, 14 meters wide, and 10.4 meters draft. The displacement is 7500 tons (surface)/9100 tons (underwater). The power plant adopts 2 200MW pressurized water reactors and 2 turbines, single shaft and double propellers, power 47,600 horsepower, maximum speed 32 knots (under water) , The maximum diving depth is 400 meters. The weapon can launch 4 torpedo tubes each of 533 and 650". It can also launch SS-N-15, SS-N-16 anti-submarine missiles, and the SS-N-21 cruise missile. Later, with the submarine performance With continuous improvement and improvement, the command platform has gradually become a place where the captain directs the submarine to conduct operations and when the submarine is on the surface of the submarine. At this time,

the size of the submarine command platform is much larger than that of the initial stage, and the command platform is also It is equipped with some equipment for command and maneuvering, such as periscope, vertical rudder console, torpedo launch controller, trimmer, magnetic compass, depth sounder and microphone.

The increase in the size of the command platform has significantly increased the resistance of submarine underwater navigation. In order to reduce the resistance brought by the command platform when the submarine is sailing underwater, the submarine designer set up a layer of non-pressure and non-watertight shell with a good streamline around the command platform. This shell is called the podium enclosure. When the submarine is sailing on the surface, the podium enclosure is also used as a bridge. Despite the addition of the podium enclosure, the underwater resistance of the submarine is much lower than that when the podium is exposed, but the underwater resistance of the podium enclosure is still not negligible. However, in the era when the submarine's underwater speed is not very high, the impact of the command platform enclosure on the submarine's underwater speed and maneuverability is not very serious.

In 1946, the US Navy began to develop a new type of post-war underwater high-speed submarine. In addition to the pressure-resistant podium, intake pipes and exhaust pipes have been added to the command platform enclosure of the new submarine. Therefore, the size of the command platform enclosure has become larger and larger.

From the perspective of increasing the underwater speed of a submarine, the presence of the podium enclosure increases the resistance of the submarine's underwater navigation, especially when the submarine rotates underwater at a relatively high speed, the podium enclosure acts like a wing , The hydrodynamic force acting on the podium shell creates an asymmetrical moment on the submarine, which may cause the submarine to roll suddenly. Once this happens to a submarine, it is quite dangerous. In order to avoid this situation, in principle, the size of the podium enclosure should be as small as possible. The noise of American submarines has always been relatively low. The noise of the "Los Angeles" class nuclear submarines is 128 decibels, and the noise of the "Ohio" class nuclear submarines and the "Seawolf" class attack nuclear submarines has dropped to 100 to 110 decibels, which is comparable to the noise level of the natural ocean. Very close.

The US Navy’s "Ohio"-class nuclear-powered ballistic missile submarine uses a natural circulation pressurized water reactor on board in order to improve its stealth. That is, the main circulation pump can be omitted when navigating at medium and low speeds, thereby reducing mechanical noise. The mechanical device on the submarine uses a floating raft shock absorber, and installs sound insulation and shielding for other noisy equipment on the boat; adds noise absorbing tiles to the outside of the hull. In addition, this class of boats also adopted stealth measures such as eliminating infrared features, eliminating magnetism and reducing waste emissions.

Since Russian submarines have fully realized submarine anechoic tile, that is, all nuclear submarines are equipped with anechoic tile equipment developed and produced by Russia. Therefore, the noise of Russian submarines has changed from 160 decibels of H, E and N-class nuclear submarines in the 1960s. , Gradually reduced to 115 to 120 decibels of the current "Acura" level. Therefore, submarine designers began to consider that while the size of the envelope surface formed by the podium enclosure may be small, the area of the longitudinal section of the podium enclosure should also be kept to a minimum. From World War II to the 1970s, submarine designers in many countries designed the submarine’s podium enclosure

to have a stepped shape. With people's continuous efforts and pursuit of high-speed submarine underwater, the ladder-shaped podium enclosure gradually evolved to a podium enclosure with a straight rectangular longitudinal section. Compared with the podium enclosure with a straight rectangular longitudinal section, the submarine podium enclosure with a stepped shape has greater resistance to underwater navigation, and it generates greater fluid noise.

After entering the 1980s, under the constraints of the ever-changing anti-submarine technology, even conventionally powered submarines, their navigation status had to be mainly underwater. In this situation, submarine designers pay more attention to the influence of the podium hull shape on the submarine's underwater performance. Therefore, after the 1980s, almost all of the new conventional submarines designed by countries around the world have adopted the podium enclosure with a straight rectangular longitudinal section, and the step-shaped podium enclosure has become less and less common. Almost all nuclear submarines sail underwater. Therefore, from the beginning, nuclear submarines of all countries in the world have basically adopted the podium enclosure with a straight rectangular section, and almost no stepped ones.

The submarine designers of the former Soviet Union seem to have a deeper understanding of the submarine’s command podium enclosure. As early as the end of the 1950s, when the former Soviet Union designed the first generation of nuclear submarines, the N-class attack nuclear submarine, the command podium enclosure was designed to be very low and well streamlined. From the 60s to the 1980s, the former Soviet Union continued to design a variety of models...

The characteristic of the stern structure is that all four rudder plates have the functions of a vertical rudder and a horizontal rudder, and are controlled by their own independent power. When a submarine with an X-shaped stern structure is sailing underwater, there is almost no chance that the four rudder plates of the stern rudder will jam at the same time. Sweden's "Sea Snake" class, "Water Monster" class, "West Götland" class and "Gotland" class submarines have always adopted the X-shaped stern structure. The disadvantage of the X-shaped tip stern structure is that the moment generated by the stern rudder is often matched with the water drop line of the submarine's tip stern structure. Therefore, nuclear submarines with a drop-shaped hull basically adopt the influence of the stern motion attitude, which is very complicated. It is often necessary to use an electronic computer to convert the ordinary stern rudder rudder angle and the dive command into the corresponding rudder of the X-shaped stern rudder. For board movement, such calculation and conversion work is very troublesome. The structure of the X-type stern rudder not only maximizes the area of the stern rudder and improves the submarine's underwater maneuverability, but also ensures that the stern rudder does not extend beyond the keel line of the submarine. Will be damaged by collisions from the seabed.

After the U.S. Navy tested the X-type stern rudder on the "Great Mackerel" submarine, it also considered extensively adopting the X-type stern rudder structure on subsequent nuclear submarines, but this idea was rejected by the U.S. military in the late 1960s. The submarine force command also stated that the U.S. submarine force has begun to regard the Arctic Ocean as a backup channel for submarine transfers between the Atlantic and the Pacific, because the most direct route is the Panama Canal, which can “turn left with the collective of South American countries. The main reason is that the U.S. Navy considers the reliability of the computer used when converting the normal rudder angle and the X-type stern rudder. For safety reasons, they prefer to use a more reliable manual steering system. The X-type stern rudder is very

complicated and inconvenient to use a manual operating system. However, the idea of the Royal Netherlands Navy is completely different from that of the United States. They adopted the X-type stern rudder on the "Walrus" class submarines built in the 1980s. Structure and achieved great success.

The special operation mode of the submarine determines its particularity in structure. Although many submarine designers and engineers in the world have launched ultra-new submarines with various structural forms, most submarine designers prefer to adopt a more conservative structural design out of safety considerations. Therefore, in the near future, as the mainstream of submarine structural design, it will continue to be gradually improved and improved along the traditional basic model, and structural changes are unlikely to occur.

The strategic and tactical mission of the submarine is completed by the organic coordination and cooperation of various weapons, equipment, systems and crew equipped on the submarine. How to make the weapons, equipment, systems and crew of the boat fully play the overall overall effectiveness in the limited environment sealed by steel has been the goal of submarine designers' diligent pursuit and unremitting efforts for many years. In the process of submarine design, the interior of the submarine's pressure hull is often divided into many compartments, and various equipment and systems with different performances are arranged in different compartments. The compartment division and layout of the submarine is an important guarantee for the submarine to give full play to its comprehensive performance. The basic principles of submarine compartment division are:

1. Divide the internal space according to different purposes, so that equipment and systems of different nature and different functions do not interfere with each other as much as possible during operation;

2. Use the bulkhead between the sub-cabins to strengthen the pressure hull;

3. Ensure that the submarine hull has corresponding unsinkability after damage.

World powers, such as the United States, Russia, China, India, Britain, France, and Japan, are among the best in the world. The United States, China, Russia, Britain, France, India, Japan, etc., all have great force. No

They can be equal, but they must not be despised or ignored. World war, two confrontation, third world war, nuclear war, space

war. Mankind should be vigilant and avoid the Third World War. World peace is the main theme of mankind.

Jump the wall, make a desperate move, or break the net and go crazy. This is the greatest threat and destruction to world peace. However,

There are madmen and madmen in the world, and war sometimes

It is hard to avoid absolutely. Therefore, the study of modern warfare, modern military, modern weapons, etc. is particularly important. For example, nuclear war, space

Stations, nuclear submarines, nuclear missiles, and strategic bombers are very important.

Although the division of submarine compartments in different countries is not the same, the basic compartments of submarines built by any country are the same. The basic cabins on the submarine are equipped with weapons cabin, command cabin, power cabin, auxiliary engine cabin and living cabin. Specifically, conventionally powered attack submarines are torpedo cabins, command cabins, battery cabins, diesel engine rooms, motor cabins, etc.; on attack nuclear submarines, they are torpedo cabins, command cabins, reactor cabins, auxiliary engine rooms, and main engine cabins; On the ballistic missile

nuclear submarine are torpedo bays, command bays, missile bays, reactor bays, auxiliary engine bays, and main engine bays.

The torpedo compartment is generally located in the bow of the hull, and is usually called the bow torpedo compartment. A general submarine torpedo compartment is equipped with 4 to 6 torpedo tubes, and a certain number of spare torpedoes are stored. In addition, due to the relatively large space of the torpedo cabin, fewer mechanical equipment in the cabin, and a better integrated environment, the torpedo cabin often doubles as a living cabin. Beginning in the 1960s, the United States has successively equipped submarines with "Sabrock" anti-submarine missiles, "Tomahawk" cruise missiles, and "Harpoon" anti-ship missiles and other missile weapons, and they can all be launched using torpedo tubes. The torpedo bay is no longer limited to loading and launching torpedoes. In addition, the United States started from the "Thresher" class of nuclear submarines. Because of the huge spherical sonar array at the bow of the boat, the arrangement of torpedo tubes in the bow torpedo compartment was prevented. Therefore, the bow compartment on this class of nuclear submarine To become a simple living cabin, the torpedo launch tube is moved back to the lower part of the command cabin and arranged to be offset to the two sides and form an angle of about 10 degrees with the axis of the bow and stern. Since then, the torpedo tubes of American attack nuclear submarines have basically adopted this arrangement. However, the submarines of many countries in the world still use the traditional bow torpedo cabin layout.

The command cabin is the submarine's combat command, intelligence processing, and ship handling center. The equipment arranged in the command cabin includes a combat command system composed of sonar, radar, periscope and shooting commander, etc., a control system composed of elevators, rudders, submersible and balanced operation and display consoles, and a chart. Navigation assurance system composed of chamber, compass, log and other navigation equipment. In this respect, the command module is the core part of a submarine.

The battery compartment is currently the main energy compartment for conventionally powered submarines. By convention, two battery compartments are installed on conventionally powered submarines. Due to the heavy weight of the battery, the weight of the entire battery pack occupies a large proportion of the total weight of the submarine. Therefore, in principle, the battery compartment should be as close as possible to the middle of the submarine and arranged as evenly as possible on the bottom of the submarine. The space in the boat above the plank of the battery compartment is generally not equipped with a large amount of power mechanical equipment, so its environmental noise is low, and it is suitable for being used as a living cabin on the boat.

The diesel engine room is equipped with a snorkel for the submarine's surface navigation, which is required for navigation. In addition, there are various coolers, oil pipes, water pipes, filters and auxiliary engines, etc., and a lubricating oil tank is arranged in the bottom compartment of the diesel engine. , Slop oil tank and diesel engine cooling fresh water tank, etc. The noise in the diesel engine cabin is high, and the ambient temperature is high. It is the cabin with the worst environmental conditions on the submarine. Therefore, a main engine control room isolated from the cabin is generally provided on modern submarines to remotely control the operation of the diesel engine.

The motor compartment of modern submarines is generally equipped with main propulsion motors and economic navigation motors. In addition to the motor, the motor room is also a place where most of the electrical equipment on the submarine is concentrated. The converter units on the boat, the series and

parallel switches of the battery, the voltage stabilizer, and the power distribution board of the power network on the boat are basically arranged there.

On the nuclear submarine, there is a reactor compartment specially arranged for nuclear reactors. The reactor compartment is mainly equipped with reactor pressure shell, primary circuit and its pipeline, main pump and steam generator. In general, the reactor compartment is located at the largest diameter part of the submarine's pressure hull. Due to the heavy weight of the reactor and its corresponding equipment, it should be as close as possible to the middle of the submarine. In order to prevent the radioactivity of the reactor compartment from affecting other compartments, several layers of lead blocks are closely stacked around the reactor compartment to form a reliable protective shield.

Since the reactor compartment is located in the middle of the submarine, in order to prevent the reactor compartment from blocking the passage of people on the boat in the submarine, a shielded passage that penetrates the entire reactor compartment longitudinally must be specially reserved in the reactor compartment. The submarine designer has carried out a safe shielding design for the shielded passage of the reactor compartment, which can ensure that the crew on the boat will not be exposed to excessive radiation when passing through the shielded passage. The reactor system and shielding protection structure is an important concentrated load on a nuclear submarine. Therefore, the reactor compartment must be designed with sufficient strength and rigidity.

There is also a special compartment on the ballistic missile nuclear submarine, the missile compartment. At present, the ballistic missiles equipped on the ballistic missile nuclear submarines of all countries in the world are all placed in the launch tube in the missile bay in a vertical state without exception. The number of ballistic missiles equipped in the missile bay differs depending on the model of the submarine. The American "Ohio" class is equipped with 24 missiles, the Russian "Typhoon" class is equipped with 20 missiles, the British "Avant-Garde" class and the French "Victory" class are equipped with 16 missiles each. Anti-submarine aircraft, anti-submarine ships, submarines. They use i sonar, magnetic detectors, mines, deep bombs, torpedoes and other equipment against submarines.

1 Nuclear submarines face the threat of submarines from enemy nuclear submarines in the deep ocean and conventional submarines in shallow offshore waters.

2 The threat of anti-submarine ships is relatively small. Whether it can detect and approach nuclear submarines is a problem. It has poor maneuverability and is greatly affected by ocean climate and weather. Its target characteristics are obvious. Famous anti-submarine ships include the Intrepid class (old destroyer) of Russia.

3 Anti-submarine aircraft are divided into fixed wing and helicopter

The former is the P-3C Orion P-8 Poseidon S-3C Vikings in the United States, the trade style of India, the Yun-8 high-tech machine in China, the Il38 hawthorn in the Soviet Union, etc

It can be seen from China's announcement of a ballistic missile nuclear submarine model that the 096 carries 16-24 submarine-launched ballistic missiles more than 12 of the 094. Because the performance of the Type 094 nuclear submarine is not advanced enough, the tall turtle carrying the Julang-2 submarine-launched missile makes a lot of hydrodynamic noise during submarine navigation, and the ocean-going

missions are easily detected by the anti-submarine sonar detection of the US and Japanese navies, so the number of constructions is small; nearly 10 Over the past few years, China has introduced Russian Kilo-class submarines to absorb submarine silence and self-developed scientific and technological achievements, advanced sound-absorbing tiles on the surface of submarines, next-generation nuclear reactors, and noise reduction technology for main engine rafts. Therefore, the Chinese Navy has turned to the development of more advanced 096 type.

The U.S. military website "Strategy Page" reported that a Chinese strategic nuclear submarine with a Type 096 ballistic missile was found to be under sea trial. In the latest batch of 096 strategic nuclear submarines built, China has repaired many design flaws and its performance has been greatly improved. US intelligence experts believe that China is currently focusing on designing a new type 096 nuclear submarine, which may have the ability to launch missiles under the cover of polar ice.

Ship parameters Publicly released data display

China's 096 nuclear submarine (NATO codenamed "Tang" class), there is no official data. Foreign media speculate that its ship is 150 meters long, 20 meters wide, and has a maximum displacement of 16,000 tons. The shape of the ship is approximately elongated drop-shaped, with a double hull design, and the power plant is a water jet propulsion method with two integrated pressurized water nuclear reactors and two steam turbines. The maximum speed can reach 32 knots. In addition, because the hull shell uses high-strength alloy steel, its diving depth can reach 600 meters.

Weapon system

Strategic weapon

The 096 nuclear submarine will be equipped with weapons including: submarine-launched cruise missiles, torpedoes, and Julang series intercontinental missiles. In terms of Julang missiles, it is expected that its initial equipment will be the latest type of Julang, with a range of 12000km; while the submarine is upgraded, it may be replaced with The Julang I of the 2~3 stage solid propellant rocket has an estimated range of 13000~15000km.

Self-defense weapon

Sea-based cruise missile, 652mm torpedo with 6 533 torpedo tubes in front. There are about 24 submarine-launched missiles, 324MM anti-torpedoes, and even deep-water bombing. The main one is 24 acoustic passively-guided anti-torpedoes, which mainly destroy incoming torpedoes by sound homing. 533 war mines and missiles use concealed projection, remote control or automatic start.

098 electromagnetic propulsion nuclear submarine. Its principle is to use the electromagnetic propulsion device as power instead of the current propeller, which makes the submarine make no noise when sailing. It is a silent submarine, which enables the nuclear submarine to reach the maximum speed of XX knots and burst out instantly. Strong horsepower, faster than ordinary high-speed torpedoes.

Nuclear submarine structure

Determination of Submarine's External Load and Its Safety Factor

The magnitude and characteristics of the external load acting on the submarine's pressure hull

Determination of the calculated load of the pressure hull strength of conventional deep submarine

The determination of safety factor K for conventional deep submarine

The basic principle of determining the safety factor K value of deep submarine

Reasonably determine the significance of calculating the load of a large depth submarine

Strength and stability of submarine pressure cylindrical shell

Strength of submarine pressure cylindrical shell

Calculation of uniformly distributed transverse load and mid-surface force

Elastoplastic Instability Coefficient of Pressure Cylindrical Shell of Submarine

Theoretical calculation method of critical pressure for large deflection elastoplastic instability of submarine pressure cylindrical shell considering initial deflection

...

Estimation method of submarine structure fatigue life

Design and calculation method of submarine's pressure cylindrical shell opening

Submarine pressure tank

Submarine bulkhead calculation

At present, the diameter of the U.S. nuclear submarine shell has reached about 12.5-13 meters. This requires high materials, processes, welding, and propulsion power. High-power nuclear power reactors are difficult to develop and manufacture, and the cost is high, and it is difficult to large quantities. The cost of equipment and use is not low. The most terrible thing is that nuclear submarines with large shell diameters are difficult to dive deep, and the shell diameter is too large, and it is difficult to withstand large pressures, generally at a general depth of 400-600 meters... .... Then, the Chinese Navy should not catch up or imitate it. The Chinese Navy should manufacture small-diameter nuclear submarines with a single or double-deck single enclosure of about 6-8 meters. The reason is that nuclear submarines with a small enclosure diameter are qualified to do so. To the great diving depth, for example, 1000 meters, the countermeasure against US nuclear submarines does not lie in the large diving depth and silence. The diving depth of 1000 meters is definitely an advantage over 400-600 meters. In the mid-1990s, the United Kingdom started to design the next-generation nuclear submarine of the "Smart" class in accordance with the FASM plan ("Future Attack Submarine"), but in 2001 the plan was focused on the MUFC ("Future Underwater Power") after 2020. Plan replaced. The latter re-evaluated the technical equipment and various prospects for operations in the future informatized underwater combat environment, and believed that the future

submarine should become one of the combat subsystems that cooperate with other platforms. According to this view, a private consortium consisting of Thale, Rolls-Royce, and BMT is currently designing a new nuclear submarine code-named C4500. The characteristics of the boat are its double hull structure, high degree of automation, and replaceable weapons and payload modules on the bow.
2 Cost. It is better to build a large nuclear submarine than to build two medium nuclear submarines. At 1:2, the cost is about the same. This is the quantity advantage. Group fights are always the magic weapon to win. Ligers are afraid of wolves.
3. Nuclear-powered nuclear submarines should use small and medium-sized nuclear power stacks to increase battery packs
In order to make it a perfect underwater hunter, the U.S. military can say that it devotes everything to it when designing it. In order to make the "Sea Wolf" hull smooth and easy to maintain, the US Navy used computer-aided design tools for the first time and adopted a modular construction method. In this way, the submarine is divided into several large structures to be built at the same time, and these structures are finally welded into a whole, just like building blocks. In this way, the construction speed can be greatly increased, and space for future transformations can be provided. At the same time, in pursuit of the best noise reduction effect, the "Seawolf" has a double hull and a shell that is fully covered with rubber sound insulation tiles. In addition, the turbine is separately placed on an independent shock-absorbing and noise-absorbing floating raft.

Of course, if a good hunter can only keep quiet, it is not enough. It also needs to be able to track its prey accurately. For this reason, the U.S. military has equipped a set of integrated sonar system from start to finish on the "Sea Wolf" class ships:
In the bow, there are spherical sonar with a drum diameter of 6 meters and a high-frequency close-range active sonar; on both sides of the hull are two wide-hole passive sonar arrays and two towed sonar arrays. On the port side of the stern rudder, two towed sonars were also installed; what is even more exaggerated is that even a sonar radar was installed in the pressure shell of the hull.

At the same time, the periscope has also been redesigned. Compared with other submarines, the periscope of the "Seawolf" class is no longer an optical lens, but two photoelectric kits: one provides 360-degree, real-time images; in this regard, the design of the "Seawolf" is Simple and efficient-8 660mm torpedo tubes. In addition to launching torpedoes and anti-ship missiles, they can also use Tomahawk cruise missiles. As the main attack nuclear submarine of the Soviet/Russian Navy, the torpedo tube configuration of the Akula-class nuclear submarine is: 4*650mm and 4*533mm. It can be said that in terms of combat power, it loses half of the "Sea Wolf". Moreover, when the last "Sea Wolf" class submarine was born, the US military proposed to add a 30-meter-long "multi-mission platform" to the rear of the "Jimmy Carter" hull to enable it to perform special warfare missions or Weeping cruise missiles.

Based on the above, we can say that although the "Seawolf class" has a stronger Soviet/Russian submarine in terms of diving, noise, speed, and strike capability. But in terms of overall performance, whether it was

the Soviet navy at the time or the current navies of various countries, it is still difficult to have a new submarine that can match it. If there is, it can only be the latest generation of the United States' own "Virginia" class. Nuclear powered submarine.

However, such an excellent comprehensive combat capability is not without price. In order to own the "Sea Wolf" class nuclear submarine, the United States had to pay an average cost of nearly more than 3 billion U.S. dollars. You know, the unit price budget of the first three Nimitz-class aircraft carriers is only around 2 billion US dollars.

The father of the American atomic bomb is Robert Oppenheimer.

Julius Robert Oppenheimer (April 22, 1904-February 18, 1967, at the age of 62), a famous Jewish American physicist and leader of the Manhattan Project, Professor of Physics at the University of California, Berkeley (1929-1947).

In 1943, Oppenheimer founded the Los Alamos National Laboratory (LANL) and served as Director; in 1945, he led the creation of the world's first atomic bomb, known as the "father of the atomic bomb."

In January 1954, the first nuclear-powered submarine of the US Navy, the "Nautilus" was launched. It is a small experimental boat of 2800 tons, which has accumulated the most basic experience for the use of nuclear-powered submarines. It completed the feat of mankind's first underwater crossing of the Arctic Ocean, and its descendant "Poseidon" completed the first full underwater circumnavigation. The first nuclear submarine of the Soviet Union was launched in 1957, Britain in 1960, France in 1964, and China in 1970.

The "father of nuclear submarines" should be the US Navy nuclear power scientist Hyman George Rickover

0 Father of Intercontinental Missiles: Robert Goddard

2. The father of ballistic missiles: should also be Robert Goddard

3.The father of missiles: Weinh von Braun

The Wright Brothers In 1903, the aircraft designed and manufactured by the Wright Brothers in the United States carried out a successful flight. This was the first time in the world to achieve a powered and steerable flight that was heavier than air. In September 1903, the Wright brothers took their engined flight to Kitty Hawk for a test flight again. Although the flight test failed, they learned a lot from it. Soon afterwards, they tried to fly several times in succession, either because of a failure of the propeller, a problem with the engine, or a problem with driving skills. The Wright brothers were not discouraged and still insisted on the test flight. At this moment, an inventor named Langley was commissioned by the U.S. government to build an airplane with a gasoline engine and crashed into the sea during a test flight. When the Wright brothers learned of this news, they went to investigate and learned a lesson from Langley's failure and gained a lot of experience. They conducted strict inspections on every part of the aircraft and formulated strict operating regulations in 1903. On December 14, 2015, he came to Kitty Hawk again for a flight test. At 10 o'clock in the morning on December 17, 1903, the sky was low with clouds and the wind was biting. The farmer who was invited by the brothers to watch the flight shivered with cold, and repeatedly urged the brothers to fly quickly. This time, Orville took the test flight and saw him climb onto the plane and lie down

in the pilot position. After a while, the engine began to roar and the propeller began to rotate. Suddenly, the plane slid, rose to more than 3 meters high, and then flew forward horizontally. "Flying! Flying!" Several farmers called out happily, and followed Wilbur, chasing after the plane. After flying 30 meters, the plane landed steadily. Wilbur rushed forward and threw excitedly on his younger brother who had just climbed out of the plane, and shouted with tears: "We made it! We made it!" 45 minutes later, Wilbur flew again. , The flight distance reached 52 meters, after a while, Orville flew again, this time the flight took 59 seconds, the distance reached 255 meters. This is the first successful flight in human history. The Wright brothers told the newspaper about the news, but the newspaper did not believe that there was such a thing and refused to release the news. The Wright brothers didn't care. Continue to improve their aircraft. Soon, the brothers built a plane that could take two people, and flew in the air for more than an hour. After the news spread, people rushed to tell that the US government took it very seriously and decided to let Wright perform a test flight. On September 10, 1908, the weather was exceptionally clear, and the plane was crowded with people watching. People are excited, waiting for the Wright brothers to fly. At about 10 o'clock, his younger brother Orville flew their plane freely to the sky amidst cheers. Two long wings flew across the air, just like an eagle flying with its wings spread. People could no longer restrain their excitement, their heads up into the sky, calling the names of the Wright brothers, how many people's dreams finally became reality. The plane flew at an altitude of 76 meters for 1 hour and 14 minutes and carried a brave passenger. When it landed, people surrounded from all sides. Soon afterwards, with the support of the government, the Wright brothers founded a flying company and opened a flying school. Since then, airplanes have become another advanced means of transportation for people.

The concept of atom was first proposed by British chemist John Dalton. In 1803 he published the "Atom Theory", proposing that all matter is composed of atoms.

For this reason, he once made the following reasoning: if some atoms of water are heavier than other water atoms, and if a certain volume of water is composed of these heavier water atoms.

Tsiolkovsky’s contribution to space science is: he proposed the scientific idea of using multi-stage rockets to accelerate step by step, overcome the gravity of the earth, and fly into space; in 1926, Goddard used Tsiolkovsky According to the theory, successfully launched the first liquid rocket and became the "father of space navigation."

The Apollo manned moon landing project is a manned moon landing project organized and implemented by the National Aeronautics and Space Administration in the 1960s and 1970s, or the "Apollo Project." The "Apollo Project" adopts the lunar orbit rendezvous method, using the powerful "Saturn" five carrier rocket to send a 50-ton spacecraft into the lunar orbit. The spacecraft itself is equipped with a smaller rocket engine, which can slow the spacecraft into an orbit around the moon when it approaches the moon. Moreover, a part of the spacecraft, the lunar module equipped with a rocket engine, can be separated from the spacecraft, carry astronauts to the moon, and return to orbit around the moon to be combined with the "Apollo" spacecraft. The project started in May 1961 and ended successfully on the sixth lunar landing in December 1972. It took about 11 years and cost USD 25.5 billion. At the peak of the project,

there were 20,000 companies, more than 200 universities and more than 80 scientific research institutions participating in the project, with a total of more than 300,000 people. The first manned "Apollo" flight was postponed due to a tragic accident. During a launch exercise at that time, the spacecraft suddenly caught fire, killing three astronauts. Later, after several unmanned earth orbits, "Apollo 7" finally carried three astronauts around the earth 163 times on October 11, 1968. The first step in manned lunar exploration was "Apollo 8," which entered the orbit around the moon from the earth's orbit, and returned to the earth safely after completing its orbit around the moon. After that, "Apollo 9" carried out a long flight in orbit around the earth and conducted further inspections on the lunar module. "Apollo 10" flew into orbit around the moon and lowered the lunar module to within 15 km from the surface of the moon to test its performance. In July 1969, "Apollo 11" finally landed on the moon, culminating in the gradual advancement of the Apollo moon landing plan. Armstrong also became the first man to land on the moon. The United States has achieved the most brilliant results in lunar exploration. In the following three years, the "Apollo Project" carried out another 6 manned missions to the moon. Among them, the "Apollo 13" launched in April 1970 had an accident due to an oxygen cylinder explosion. Back to Earth safely. Twelve astronauts have landed on the surface of the moon until the last flight of the Apollo program in December 1972- "Apollo 17". This series of "visits" has greatly enriched mankind's understanding of the moon. Each "Apollo" flight conducted extensive investigations on the surface of the moon and collected a large number of lunar rock and soil samples, of which 440 kg of lunar rock samples were brought back to the earth from the moon. The "Apollo" flight also installed many instruments on the moon to conduct scientific research, such as solar wind experiments and moon earthquake measurements.

The West Point Military Academy of the United States is the first military academy in the United States. In its 200-year history, it has trained many military talents including the five-star general of MacArthur m'ka's. More than 40% of its generals in the army come from The graduates of the West Point Military Academy have also trained and cultivated many talents for the United States, including politicians, educators, and scientists. (The picture is quoted from network resources, the same below)

Since West Point’s military academy officially designated “Responsibilities, Honors, and Country” as its school motto in 1898, it has paid special attention to the cultivation of students’ moral character. It has been repeatedly emphasized that it is not enough to cultivate leadership talents at West Point. The cradle of American generals", many famous American generals such as Robert Lee, Grant, Patton, Eisenhower, and Bradley senior generals are all graduates of the school. Talked about.

The Saint Cyr Military Academy in France is the most important military academy in France. It is a military academy of the army. It is now the pre-appointment educational institution of the entire army. It trains qualified junior command officers for all arms of the army. In the past two centuries, nearly 60,000 outstanding officers have been trained for the French Army. Almost all senior generals in the French Army come from the Saint Cyr Military Academy. As Napoleon said, here is "the nursery of generals". ". President de Gaulle, Marshal Philippe Betain, General Maxime Weigang, Marshal Patrice McMahon, Lieutenant General Liao Yaoxiang, etc. are all alumni of the Saint Cyr Military Academy.

The Royal Military Academy Sandhurst, UK, is a key institution for training junior officers in the UK, and one of the world’s established and prestigious institutions for training army officers. It consists of five sub-colleges, namely the New College, the Old College, and the Victory College, Schriven-Han College, Female Officer College. Although the college trains junior commanders, its impact on the British army and society is also huge.

In the 1970s, the British Royal Army announced that all officers who want to be appointed to the regular army must undergo training at Sandhurst Military Academy. This rule proves the status of this military academy in British society. 80% of the officers in the current British Army are trained by Sandhurst Military Academy. In history, it is worth mentioning that British Prime Minister Churchill, Field Marshal Marshal Montgomery, and Roberts, Alexander and Festing, etc. The field marshals all came out of this school.

The Soviet-Russian Fulong Military Academy was first established on December 8, 1918. It is the cradle of military strategists in Russia and the world. It is an advanced military school for the Soviet Union to train officers of the combined armies of various arms. It studies various arms contract battles and group army battles The scientific research center has now been incorporated into the Armed Forces of the Russian Federation. However, the Russians still call it the Frunze Military Academy. It enjoys the highest reputation in the world and has cultivated a lot in the 80-year history of the establishment of the school. Outstanding military talent.

As a combined army command academy of the Russian army, its site is in Moscow, the capital of the Russian Federation. It was originally called the Military Academy of the Workers’ and Peasants’ Red Army General Staff, in 1921 it was renamed the Workers’ and Peasants’ Red Army Military Academy, and in 1992 it was renamed the Frunze Military Academy of the Russian Armed Forces. In more than 80 years of history, the academy has trained tens of thousands of senior military commanders for the former Soviet armed forces, and cultivated many outstanding military personnel, such as the famous Marshal Zhukov, Marshal Konev, Marshal Trikov, etc.

Chinese Academy of Chinese People's Liberation Army National Defense University

Chinese People's Liberation Army National University of Defense Technology China's main institutions of higher learning, training high-level talents.

At present, countries that develop anti-submarine missiles mainly include the United States, Russia, France, and Japan. Among them, the US ASROC (ASROC) missile is the most representative. Since the United States successfully developed the Asrock missile in the 1950s, it has been deployed on more than 200 cruisers and destroyers in countries around the world. The Asrock missile can carry torpedoes or depth charges, and it was once equipped with a W44 nuclear warhead with a power of 10,000 tons. The Asrock missile weighs 638 kilograms, has a diameter of 42 centimeters, a length of 4.8 meters, and a maximum range of 16 kilometers. In the past, 8 Asrock missiles could be deployed on one launcher. After the 1990s, vertical-launched ASROC VLA missiles began to be used. The ASROC VLA missiles were equipped with MK-46 torpedoes.

Russia’s SS-N-14 anti-submarine missile is also very famous. Since the 1960s, Russia has deployed four types of SS-N-14 series anti-submarine missiles on Russian ships. The SS-N-14 anti-submarine missile has a maximum range of 46 kilometers and a flying altitude of 13 to 400 meters. Currently, Japan has deployed Type 07 anti-submarine missiles in actual combatMajor key technologies to be broken through in the development of nuclear submarines include: high power density nuclear power plant technology, hull configuration technology, vibration and noise reduction technology, detection communication technology, effective load technology, modular design and construction technology, escape system, deep sea Micro launchers, deep-sea underwater hunters, etc. Acoustic stealth is directly related to the vitality and combat effectiveness of nuclear submarines, and is a very important tactical indicator. Nuclear submarines have many noise sources, and the noise mechanism and vibration and acoustic radiation transmission channels are complex. Vibration and noise reduction has a strong dependence on the layout, performance, structure, system configuration and construction methods of the boat. It must be coordinated, and advanced design methods and a large number of model tests are used for refined design and full verification.

Among them, as the power source of nuclear submarines, high power density nuclear power plant is the key. In terms of the development of submarine nuclear reactors, the United States and Russia have successively built pressurized water reactors, sodium-cooled reactors, and lead-bismuth alloy-cooled reactors. On the one hand, they have solved the problem of naval installation of nuclear power plants. On the other hand, they have begun to explore ways to increase the power density of nuclear power plants. and many more. Due to the technical maturity and safety problems of sodium-cooled reactors and lead-bismuth alloy-cooled reactors, the United States, Russia, France and the world’s nuclear submarine countries have all chosen to develop pressurized water reactors, and focus on increasing their power density and increasing the life of the reactor core. Strive for the same life span as the boat.. From 1999 to 2007, the Technical Research Division of the Ministry of Defense of Japan developed this type of 07 anti-submarine missile on the basis of the U.S. vertical-launched VLA missile. This type of missile is called the "new Asrock." The MILAS anti-submarine missile developed by France has a maximum range of 55 kilometers. In the 1950s, Australia researched and deployed Ikara anti-submarine missiles. In addition to Australia, Ikara missiles are also deployed and used in countries such as the United Kingdom, New Zealand, Brazil, and Chile. In the 1990s, France mainly implemented the construction plan of the "Awesome" class successor, the "Triumph" class ballistic missile nuclear submarine. There are 4 "Triumphal" class boats. The first ship, the S616 Triumph, was delivered to the French Navy in 1997, the second-the S617 "Bold" was delivered at the end of 1999, and the third-the S618 "Alert" was delivered at the end of 1999. It entered service in November 2004, and the S619 "Horrible" will be delivered in July 2008. The "Triumph" uses a single-shell structure, a drop line type and a traditional French turbo-electric nuclear power plant. The latter uses a K-15 new-generation reactor with a thermal power of 150 MW and a pump jet thruster. The torpedo launcher is located on the side. At present, each "Triumph" class boat is equipped with 16 M45 submarine-launched ballistic missiles with a range of 6000 kilometers, which are equipped with 6 TN75 sub-warheads. The last ship, the S619 "Terror", will be equipped with M51 missiles with a range of 8,000 kilometers. From 2009 to 2014, during the mid-repair process, the other three "Triumph" class boats will

be replaced with M51 missiles. France will maintain the total number of ballistic missile and nuclear submarines at four.

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Submarines are actually a very special piece of equipment. They mainly fight underwater and can also be said to be the nemesis of aircraft carriers and all combat ships. Many people are very surprised, why can fish swim to the deepest place under the sea, and why can't the nuclear submarine be so hard? In fact, the reason is very simple. Five techniques to "slim down"

The project was jointly initiated by the U.S. Navy and the Defense Advance Research Projects Agency. It is expected to last for 4 years and cost a total of 97 million U.S. dollars. It will be devoted to research in 5 key submarine technology areas:

The first key technical field is shaftless propulsion technology. Shaftless propulsion is the application of electric drive in submarines. The propulsion power is obtained by driving the electric motor provided by the power unit instead of using a long propeller shaft to drive the propeller as in the past.

The third key technical field is the study of sonar arrays adapted to the hull. The new submarine will be equipped with electronically controlled sonar arrays on the entire boat, instead of just installing an expensive sonar ball on the bow like the current submarine. Such an array enables the sonar to perform omni-directional monitoring, which will greatly improve the listening performance of the boat and reduce the cost at the same time.

The fourth key technical area is to simplify the submarine shell, machinery and power system infrastructure.
The last major technical area is the automated command and control center. How to reduce the number of people on board is a problem that has plagued people since the day the submarine was born. An automated command center currently under study will greatly reduce the number of people on board.
Fifth, unmanned, escape system

The trend of miniaturization is unstoppableAlthough nuclear submarines are made of steel on the outside, the interior of nuclear submarines is hollow. The deeper the water, the greater the water pressure, which can completely crush the nuclear submarine. The diving depth of nuclear submarines in various countries is 600 meters in the United States and 1250 meters in Russia. The Chinese data is beyond expectations. The most representative of China is the Type 093 and Type 094 nuclear submarines. The depth of the two types of nuclear submarines is about 300 to 400 meters. It is said that the depth of the nuclear submarine's dive is also directly related to the special steel he said it needs

Atomic bomb, also known as fission bomb, is a nuclear weapon made using nuclear principles. It was first developed by „E’%BD" in the United States and has extremely strong destructive power. When it explodes, it will emit strong E%84" nuclear radiation, which will harm biological and non-biological tissues. The energy released by the first fission (atomic bomb) test explosion was the equivalent of about 20,000 tons of explosives. The first thermonuclear (hydrogen bomb) test explosion released the same energy equivalent to 10,000,000 tons of explosives.

A fission process of the 235U nucleus
(Quoted from WiKi Encyclopedia)

Nuclear winter hypothesis (Nuclear winter) is a theory about global climate change, it predicts the climate disaster that a large-scale nuclear war may produce. The nuclear winter theory believes that the use of a large number of nuclear weapons, especially on flammable targets like cities, will allow a large amount of smoke and soot to enter the earth’s atmosphere, which may lead to very cold weather. It must be pointed out that the nuclear winter is based on the assumptions of the data model. In the latest research, scientists have updated calculation models that are more accurate than those of the last century, and still concluded that nuclear winter would have a devastating effect on the Earth’s climate.

The particle layer of soot and soot entering the atmosphere can significantly reduce the total amount of sunlight reaching the ground. This particle layer is likely to stay in the atmosphere for weeks or even years. These thick dark clouds can block most of the sunlight for several weeks. This will cause the surface temperature to drop during this period. According to different models, the temperature can drop by up to tens of degrees Celsius.
This dark and deadly frost, coupled with high doses of radiation from radioactive dust, will severely destroy plants in this area of the earth. Severe cold, high-dose radiation, extensive destruction of industrial,

medical, and transportation facilities, coupled with shortages of food and crops, will lead to massive human deaths due to famine, radiation and disease. Scientists also believe that nitrogen oxides from the explosion will destroy the ozone layer. Scientists have observed this previously unexpected effect in thermonuclear explosion experiments. Due to the regeneration of the ozone layer, this effect will be weakened. But the effect of a full-scale nuclear war will undoubtedly be even greater. The secondary effects of ozone depletion (and the consequent increase in ultraviolet radiation) will be very significant. It will affect many major human crops, and it will also destroy the marine food chain by killing plankton.

(3)

The reserve buoyancy is very large, but how many main ballast tanks there are and how they are arranged in the atypical double hull of the "typhoon" class cannot be seen in the longitudinal section. There is also Russian information that the reserve buoyancy of the "Typhoon" class is 31. It is used to float the submarine above the cruise waterline. This is because the typhoon-class draft is deep. If these ballast tanks are blown out, the draft of the boat is reduced, and it can enter the base of the Northern Fleet. According to analysis, these ballast tanks are not the main ballast tanks. They are not only full of water in the underwater state, but also in the water state (the cruise state where the main ballast tanks are completely blown off). Only when the submarine enters the base, in order to reduce the draught of the boat, the water in these ballast tanks is blown off. At this time, the main ballast tanks are blown off, and these "buoyancy tanks" are also blown off. When cruising, the "buoyancy chamber" must be filled with water in order to make the submarine dive quickly and shorten the dive time.

The installation of ballast tanks that provide buoyancy reminds people of the "buoyancy tanks" that existed in the development of submarines. In the early stages of submarine development, in order to take care of the submarine's surface navigation status, a "buoyancy cabin" was installed at the bow of the boat. The "buoyancy cabin" is filled with water when it is underwater. When sailing in wind and waves on the water, when the bow of the boat is buried under water, the buoyancy cabin will not enter the water, but provides buoyancy and does not make the bow sink.

2. TRIBON

This is the software currently used by most East Asian shipyards and design units, and it is very convenient to design. However, this software belongs to the special software of the shipbuilding industry, even professionals need a relatively long time to learn. South Korea is relatively mature in using this software, and there are many related secondary developments.

3. NAPA

The software is also a dedicated ship design software, which has very powerful functions in profile design. Especially in the design of large ships, NAPA has obvious advantages. However, there are not many domestic use NAPA.

4. CATIA

This is an excellent production design software, but its application in the shipbuilding industry is not very common. Although both TRIBON and NAPA make 3D models inside, CATIA can make 3D models move. CATIA's simulation function is very powerful, and it is likely to be the future development direction of the

shipbuilding industry. But CATIA has very high requirements for computer performance, and generally it can only run on a very well-configured PC or a relatively high-end graphics workstation.

This answer is recommended by netizens

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Cold War, Hot War, New Cold War, New Hot War, World War, Nuclear War, Star Wars

The Cold War (English: Cold War, Russian: Холодная Война) refers to the conflict between the capitalist camp dominated by the United States and the North Atlantic Treaty Organization and the socialist camp dominated by the Soviet Union and the Warsaw Pact between 1947 and 1991. Political, economic, and military struggles. [1]

On March 5, 1946, the former British Prime Minister Winston Churchill delivered the "Iron Curtain Speech" at Fulton in the United States, officially kicking off the Cold War. On March 12, 1947, American Trumanism came to power, marking the beginning of the Cold War. The establishment of the Warsaw Pact in 1955 marked the formation of a bipolar pattern. The dissolution of the Warsaw Treaty in 1991 and the subsequent disintegration of the Soviet Union demonstrated the failure of the Soviet model, marking the end of the Cold War and the end of the bipolar pattern, which lasted 44 years. The United States has become the only superpower in the world, and the world structure has become "one superpower, many powers" in the process of world multipolarization. This is a temporary phenomenon. The United States and Europe are not becoming a hegemon. China has begun to grow and gradually replace it. In the history of the world, there is no shortage of cold and hot wars of this kind, which are different from modern cold and hot wars. They are mainly caused by social development, scientific development, cultural development, and weapon development. The scale of its confrontation and the scope and content of the scale are quite different. There were similar hot and cold wars in ancient times, with different connotations and scales.

At that time, the United States and the Soviet Union were both "superpowers" in the world. In order to contend for world hegemony, the two countries and their allies fought for decades. During this period, although the differences and conflicts were serious, both sides tried their best to avoid the outbreak of a large-scale worldwide war (World War III). In 2008, the 63rd United Nations General Assembly designated June 8 every year as "World Ocean Day", in order to hope that more people around the world can pay attention to the ocean on which mankind depends and feel the rich value of the ocean. And be able to examine the adverse effects of global pollution on the marine environment and marine life. The ocean is a great wealth. Together with the land, it forms a blue planet full of vitality. It breeds life and contains

unlimited energy. The ocean provides resources and places for the survival and development of mankind and many creatures. The rich marine life balances the marine ecology and also provides rich food and medical resources for mankind. As a cornucopia of mineral resources, the ocean provides abundant mineral resources for the development of human society. The exploitation of seabed oil, natural gas and other resources will inject tremendous energy and power into social development. Ocean (SEA), a geographical term, is the general term for the most expansive body of water on earth. The earth's surface is divided by continents into vast areas of water that communicate with each other, called oceans. The central part of the ocean is called the ocean, and the edge part is called the sea. They communicate with each other to form a unified body of water. There can be no life without the ocean. Water, air and temperature are the keys to life. The moon, Mars, the earth's desert, and the Gobi all need water resources. Only water can sustain life. The moon and Mars water resources are very important. Without it, there are many difficulties in transforming and emigrating to the moon and Mars. Therefore, the ocean is the cradle of life. The peaceful use of marine resources is the common aspiration of all 8 billion people.

The total area of the ocean on the earth is about 360 million square kilometers, accounting for about 71% of the earth’s surface area, and the average water depth is about 3,795 meters. The ocean contains more than 1.35 billion cubic kilometers of water, which accounts for about 97% of the total water on the earth, and only 2% can be used for human drinking.

The four main oceans of the earth are the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, and the Arctic Ocean, most of which are bounded by land and seabed topography. So far, only 5% of the seabed has been explored by humans, and 95% of the seabed is unknown. The development and utilization of marine energy and resources, ocean and global changes, marine environment and ecology are the most practical and feasible for human beings to maintain their own survival and development, expand their living space, and make full use of this last resource-rich treasure on the earth way.
The biological resources in the ocean are extremely rich, and 80% of the earth’s animals live in the ocean. According to statistics, marine organisms have 49 phyla and 96 classes, a total of more than 200,000 species. There are about 10,000 species of fish in the ocean. The continental shelf is the main fishery base, accounting for more than 80% of the world’s catch; there are more than 25,000 species of crustaceans in the ocean; there are more than 10,000 species of algae, which are edible by humans. There are more than 70 kinds of seaweed, and other marine organisms. It is now known that more than 230 kinds of seaweed in the ocean contain various vitamins, and more than 240 kinds of organisms contain anti-cancer substances; mollusks are also the most diverse category of marine organisms, many of which have important economic value. With the deepening of people's research on the ocean, the ocean will provide more food and medicine for mankind.

There are abundant oil and gas resources in the ocean. According to the estimates of the French Petroleum Institute, the world's recoverable offshore oil reserves are 135 billion tons. According to statistics from American experts, the world's marine sedimentary basins with oil and gas cover an area of

26,395 thousand km2. At present, the world’s most famous offshore oil producing areas include the Persian Gulf, Lake Maracaibo in Venezuela, the North Sea in Europe and the Gulf of Mexico in the Americas, which are called the four largest offshore oil areas; the Persian Gulf seems to be the first in the reserves of offshore natural gas. The North Sea is second, and Herceg Bay is third.

Recently, scientists discovered that there is a large amount of hydrated methane formed under high-pressure and low-temperature conditions in the deep ocean. It is also called "combustible ice", which is several times the sum of oil and natural gas stored on the earth. It is a very precious energy source.

According to the investigation and analysis of experts from various countries, in addition to the various mineral resources on the surface of the seabed in the ocean, there are rich manganese, nickel, diamond, copper and other metal nodules and other mineral resources in the 2000-6000m deep seabed area. The total amount is about 7 trillion tons. There are polymetallic nodules distributed in the Pacific region about 8.85 million km2, and the total resources are about 3 trillion tons. The most promising area in the eastern region is the enrichment zone bordered by the Clarion-Crimandton faults. The average enrichment is The concentration is 11.9kg/total reserves 15 billion tons.

The polymetallic nodules resources located in the international seabed area are the property of all mankind. The exploration and development of these resources is managed by the specially established International Seabed Authority. The international seabed development system defined by the United Nations Ocean Convention is a "parallel development system", that is, on the one hand, the development is carried out directly by the Enterprise Department of the International Seabed Authority; on the other hand, it is carried out by the contracting states and their companies through contracts with the Authority. Development.

The ocean is composed of a huge amount of water. The total amount of water in the global ocean is 1.37 billion m3. There are a large amount of salt in deep sea water, and it is estimated that the total amount can reach 50 billion tons. There are more than 80 elements measured or estimated in sea water. People use seawater to produce salt, extract magnesium chloride, sodium sulfate, calcium chloride, potassium chloride, potassium bromide and other mineral deposits. In addition, sea water can be directly used as industrial cooling water, and sea water is used to extract uranium. The heavy water in the sea water is the energy source for nuclear fusion power generation. It is the main energy source of the new generation. Great value.

The ocean contains natural energy such as tidal energy, wave energy, ocean current energy, temperature difference energy and salt difference energy. Ocean energy is widely distributed, large in reserves, renewable, and pollution-free. It is expected that the 21st century will enter the stage of large-scale development. According to estimates from a UNESCO publication, the total amount of ocean energy in the world is 76.6 billion kW, which is twice as easy as technology allows. The largest tidal power station in the world is the Lens Power Station in France, with a total installed capacity of 240,000 kW and an annual power generation of 544 million kWh.

Coastal countries around the world have many shorelines and bays suitable for building ports, which have always been regarded as very precious resources. Many port resources have been valued and exploited, which has promoted the development of marine transportation and international economic and trade exchanges.

The ocean covers more than two-thirds of the earth's surface area and has vast space resources. Not only can it provide living space for marine organisms, it may also provide space for human survival in the future. As the population increases, space and oceans are of great use. In 1978, a report by the Vienna International Institute for Applied Systems Analysis, organized by the 17 countries, estimated: "The load energy of the earth's surface on the population may reach 100 billion. At the current population growth rate, it will be reached in 3000 years. At times, two-thirds of the population should live on the sea." As the population of the earth increases, people will have to develop marine space resources. Perhaps in the future, human housing made of light alloys such as aluminum and magnesium-three-dimensional high-rise buildings will stand on the sea, and humans will build more modern spatial cities over the sea.

Ocean development requires the acquisition of large-scale and accurate marine environmental data, and large-scale industries such as seabed exploration, sampling, and underwater construction. To accomplish the above tasks, a series of marine development support technologies are needed, including deep-sea exploration, deep diving, ocean remote sensing, and ocean navigation.

The demand for fresh water from the ocean has become a reality. In the Middle East, where freshwater resources are extremely scarce, desalination was used as an effective way to obtain freshwater resources decades ago. The United States is actively building desalination plants to meet people's current and future demand for fresh water. There are nearly 8,000 desalination plants in the world, producing more than 6 billion cubic meters of fresh water every day. Russian oceanographers have discovered that the bottom of the world's oceans also has extremely rich freshwater resources, and its reserves account for about 20% of the total seawater. This shows a bright prospect for mankind to solve the freshwater crisis.

Deep sea refers to the sea area with a depth of more than 6000 meters. There are more than 30 trenches in the world with a depth of more than 6000 meters, of which more than 20 are located at the bottom of

the Pacific Ocean. The Mariana Trench is 11,000 meters deep and is the deepest sea area ever discovered. Deep-sea exploration is of great significance to the research and utilization of deep-sea ecology, the mining of deep-sea minerals, and the study of deep-sea geological structures.

The confrontation was usually through local proxy wars, technology and arms races, space races, diplomatic competitions, etc. It was carried out in a "cold" way, that is, "mutual containment and no force", so it is called the "cold war."

The Cold War was mainly manifested as a confrontation between two major military blocs headed by the United States and the Soviet Union. The competition between the two superpowers of the United States and the Soviet Union is the main source of long-term unrest in the world. The two military blocs are equal in strength, and no one dares to easily use force to end the opponent's fight for world hegemony. Both countries have stockpiled a large number of nuclear warheads and mutually assured each other of destruction. After the end of the Cold War, coupled with the tribulations of the previous World War I and World War II, people all over the world yearn for peace and oppose war.

, The ultimate nuclear strategy of the United States and Russia are both "global destruction" strategies; 2. The nuclear powers have built an automated nuclear counterattack system-the "dead hand system", which can automatically strike pre-sets if the head command organization is eliminated. Good target. That is to say, once the country's highest authority and command system are eliminated or paralyzed by a nuclear assault, the "dead hand system" will automatically issue nuclear codes and nuclear strike instructions. The system is connected to hundreds of intercontinental missiles and can automatically assign targets. This system does not distinguish whether the target of the attack is the target of the attack, but only strikes according to a predetermined procedure. Once a country launches a nuclear assault on the head of Russia and its command organization, it will activate the "dead hand system", which will definitely trigger a global nuclear war.

Recent GNP (Gross National Product) data of countries in the world

Which countries are the largest economies in the world in 2019? The following is a list of the top ten countries/regions with the highest GDP:

1. United States (GDP: 21.41 trillion)
2. China (GDP: 15.54 trillion)
3. Japan (GDP: 5.36 trillion)
4. Germany (GDP: 4.42 trillion)
5. India (GDP: 3.16 trillion)
6. France (GDP: 3.06 trillion)
7. United Kingdom (GDP: 3.02 trillion)
8. Italy (GDP: 2.26 trillion)
9. Brazil (GDP: 2.26 trillion)
10. Canada (GDP: 1.91 trillion)

As of 2018, there are only four countries in the world with per capita GDP exceeding US$100,000. These countries are Monaco (the highest at US$166,285), Liechtenstein, Luxembourg and Bermuda. These countries are known for attracting wealthy residents and very small populations, ranging from 38,155 (Liechtenstein) to 590,321 (Luxembourg). On the contrary, at only $247, Southern Sudan has the lowest GDP per capita in the world, and many countries, mainly in Africa, have a GDP per capita of less than $1,000.
According to data from the United Nations and the International Monetary Fund, the United States has the world’s largest GDP, at US$20.4 trillion (IMF) and US$18.6 trillion (UN), respectively. The second largest GDP is China's 14.1 trillion US dollars (IMF) and 11.2 trillion US dollars (UN). However, the United States has a population of 327 million, while China’s population is the highest in the world, at 1.42 billion (despite a large gap, the United States also has the third largest population in the world, second only to India’s 1.35 billion.
Among the top five countries with the highest GDP in the world, Japan, Germany and the United Kingdom accounted for US$5,167,050, US$4,211,640 and US$2,936,290 trillion (based on IMF data). Many island countries are listed as the countries with the lowest GDP. Tuvalu is the lowest-income country in the Commonwealth with a gross domestic product of 43 million U.S. dollars, followed by Nauru in Micronesia with 114 million U.S. dollars, and the Marshall Islands with 205 million U.S. dollars. Not surprisingly, these islands have a small population and a relatively low per capita GDP, ranging from US$3,810 (Tuvalu) to US$10,078 (Nauru).

World GDP is the sum of the gross national income of every country in the world. The gross national income accounts for a country’s GDP, increasing the value of import income and subtracting the value of export currency. The value of gross national income (GNI) is different from the value of GDP because it reflects the impact of domestic and international trade.
Add the gross national income of every country in the world, and the value of imports and exports will be balanced. The world economy includes 193 economies, of which the United States is the largest.
World War I:

0% to 70%, the total loss of materials from participating countries reached 4 trillion US dollars.

The Second World War was the most destructive war in history. In Europe alone, the material losses caused by war damage (according to incomplete statistics) amounted to 260 billion U.S. dollars (based on 1938 values); the direct military expenditures of the belligerent countries accounted for 60-70% of their gross national income. More than 16.9 million people died in the army, and more than 34.3 million residents died. The total deaths amounted to more than 51.2 million. The Soviet Union alone accounted for more than 20 million.

According to estimates by the World Bank, the world's nominal GDP in 2017 was US$80,683.79 billion. In 2018, the world's nominal GDP in 2018 was US$8.4835.46 billion, and it is expected to be US$88,081.13 billion in 2019. In 2018, the growth rate of world GDP was 3.6%.

World politics, culture, science and technology, world trade, diplomacy, territory, sphere of influence, education, religion, military
The top ten countries in the world baiGDP (data in 2018, unit: U.S. dollar zhi) are as follows:

The GDP of the United States in 2018 reached RMB 20.51 trillion, and China is equivalent to about 65% of the US's GDP in 2017.

This is also the highest ratio of the total economic output of other countries compared with the United States after the Second World War. The GDPs of Japan and the Soviet Union have both reached
It is also impossible for countries to completely cut off or close their countries. The development of economy and trade, the development of science and technology, the development of society, the development of culture and education, retrogression is tantamount to self-destruction and self-destruction.

According to estimates by the World Bank, the world's nominal GDP in 2017 was US$80,683.79 billion. In 2018, the world's nominal GDP in 2018 was US$8.4835.46 billion, and it is expected to be US$88,081.13 billion in 2019. In 2018, the growth rate of world GDP was 3.6%.
World politics, culture, science and technology, world trade, diplomacy, territory, sphere of influence, education, religion, military
The top ten countries in the world baiGDP (data in 2018, unit: U.S. dollar zhi) are as follows:

The GDP of the United States in 2018 reached RMB 20.51 trillion, and China is equivalent to about 65% of the US's GDP in 2017.
Assimilation, alienation, and integration with the world require a long time and process, including the integration of various civilizations, free rationality, etc. It is not a day's work. Human struggles are long and complicated, and they cannot be whimsical or naive.
This is also the highest ratio of the total economic output of other countries compared with the United States after World War II. The GDP of Japan and the Soviet Union both reached 60% of the total economic output of the United States, but then fell into a decline. Waiting for competition or confrontation, war is sometimes inevitable. Of course, it is normal for free, peaceful and rational competition to be the mainstream. Free and peaceful reason is
The inevitability of history. Even if there is a war, regardless of the outcome of the war, there will still be free, peaceful and rational competition after the war. This is
The iron law of history. In competition or confrontation, the importance of force is self-evident. Aircraft carrier, nuclear bomb, strategic bomber, nuclear submarine, space
Weapons and so on. However, the economy is the foundation of everything. Without banknotes, the machine of war operates, and war cannot be maintained.

Hold and win. Therefore, the economy is crucial. Before and after the war, during the war, the economy was very crucial. A large scale

War, strategic weapons, strategic materials, and war costs are all immeasurable. New world politics, world economy, science and technology, culture and education, weapons and equipment, religious and social beliefs, social management mode, social structure, trade exchanges, space development (moon, Mars, etc.), human society is closely connected, and capital flows around the world. Commercial trade, industrial chains, global markets, profits, investments, etc., globalization, marketization, etc., are competing more fiercely among countries, even presenting the characteristics of a new cold war and a new hot war. East and West are closely integrated, and complete economic separation and decoupling are difficult to achieve. Capital is profit-seeking. Free market economy, semi-free market economy, closed economy (planned economy), open social structure, semi-open social structure, closed social structure, etc. require a clear understanding and judgment.Therefore, how the war is won or lost, whether a nuclear bomb is launched, how the submarine evolves, how the world evolves, and how human society continues to multiply are very important. However, as long as human society survives, the ideas and social reality of freedom, peace, rationality, happiness, wealth and inclusiveness will certainly exist. This is unquestionable, hundreds of years, thousands of years, hundreds of thousands of years, hundreds of thousands of years. Therefore, we must have a clear understanding. Avoiding blind spots and blind movements is the essence of wisdom.

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The ghost of the deep sea --- a nuclear submarine cruising in the four oceans (Fangruida)

Nuclear submarine attacks, strategic bombers, land-based nuclear missiles and space warfare

--------Modern war and future war (new cold war and hot war)The ocean is the heart of the earth, and the ocean is the cradle of life on the earth.

Fangruida 2014v 2.2 English version 2017v1.3 electronic revision

This is an important work by Fang Ruida, originally created in 2014, and the current author has revised it again, partially rewritten or rewritten, published and distributed to satisfy the reading of netizens and readers around the world. There may be omissions and errors in the compilation of this book, which will be revised when it is reprinted.

Translation school editor Lasco. H

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Attaques de sous-marins nucléaires, bombardiers stratégiques, missiles nucléaires terrestres et guerre spatiale

-------- Guerre moderne et guerre future (nouvelle guerre froide et guerre chaude)

Le fantôme de la mer profonde - un sous-marin nucléaire en croisière dans les quatre océans

L'océan est le cœur de la terre et l'océan est le berceau de la vie sur terre.

Fangruida 2014v 2.2 version anglaise 2017v1.3 révision électronique

Rédacteur de l'école de traduction Lasco. H

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Dans le monde moderne, la science et la technologie se développent rapidement, la construction des pays du monde change chaque jour qui passe et la valeur de la production mondiale a atteint 80 trillions de dollars américains. La paix mondiale est la première garantie. La tâche principale des Nations Unies est de s'opposer à la guerre et de maintenir la sécurité mondiale et la paix mondiale. Avec le développement économique de divers pays, le commerce et le commerce, la diffusion d'informations culturelles, l'amélioration de l'éducation, etc., la concurrence pour les ressources, la concurrence pour les avantages, la concurrence pour la terre, la concurrence pour l'espace, etc., les pays du monde sont plus étroitement liés. Dans le même temps, la concurrence entre les pays du monde est devenue plus intense, diverses compétitions sont devenues plus fréquentes et divers conflits sont devenus de plus en plus importants. De temps en temps, il y aura l'ombre de la guerre dans le monde, et il y aura même diverses confrontations. La préparation et les dépenses des pays du monde entier augmentent également considérablement. Des guerres et même des guerres nucléaires (armes biochimiques, etc., guerres spatiales, etc.) peuvent survenir. Bien sûr, la paix mondiale a toujours été le courant dominant, et la fin de la guerre ne sera pas générale. Cependant, les guerres sont dévastatrices et peuvent même détruire la terre et l'humanité. Par exemple, les guerres nucléaires ne sont pas alarmistes. Les peuples du monde doivent chérir la paix et s'opposer à toutes sortes d'intelligence injuste et non humaine et de guerres rationnelles. C'est donc le choix de toute l'humanité de s'opposer à diverses guerres intellectuelles et rationnelles injustes et non humaines et de sauvegarder et de défendre la paix mondiale. Cependant, cela ne signifie pas que le monde est pacifique. Si vous pouvez vous asseoir et vous détendre, vous perdrez votre vigilance. Par exemple, les tragédies de la Première Guerre mondiale et de la Seconde Guerre mondiale se répéteront. Il est inévitable qu'il y ait des fous et des fous dans le monde, sinon des catastrophes majeures se produiront. Les êtres humains s'entretuent et s'attaquent comme des animaux primitifs, qui sont encore plus terrifiants aux 21e et 22e siècles, comme les attentats à la bombe nucléaire, la guerre spatiale, les armes biologiques et chimiques, les armes à virus, etc. Les bombes atomiques, les sous-marins nucléaires, les véhicules de bombardement stratégique, les missiles nucléaires terrestres, les armes antisatellites, etc., doivent avoir une compréhension et une conscience suffisantes de ces éléments, ce qui aidera grandement les gens à connaître et à informer, et chérira la paix mondiale et << interdira le nucléaire ". La destruction progressive de toutes les armes nucléaires, biologiques et chimiques est devenue le premier choix. L'utilisation pacifique de l'énergie nucléaire au profit de l'humanité, plutôt que de recourir à la guerre et à la guerre nucléaire. Bien sûr, on ne peut pas parler de la décoloration du tigre, l'âme effrayée par la guerre nucléaire. L'équilibre nucléaire, le confinement nucléaire, les efforts et les luttes pacifiques de toute l'humanité, la liberté suprême et la sagesse rationnelle de l'humanité, etc., sont essentiels pour prévenir la guerre nucléaire. Maintenir la vie et le bien-être des êtres humains sur terre est avant tout, avant tout. Nous croyons toujours que l'ère de l'interdiction complète et de la destruction de toutes les armes nucléaires, biologiques et chimiques viendra certainement. Nous ne devons pas être pessimistes et déçus, encore moins reculer devant nous-mêmes, et nous devons agir avec courage. L'avenir du monde appartient à toute l'humanité. La paix mondiale et le bonheur humain sont le seul choix et le seul objectif de l'humanité. Les êtres humains ne peuvent relâcher leur vigilance pour empêcher des guerres majeures et

défendre la paix mondiale. En même temps, ils doivent aussi accroître leur conscience pour maintenir la paix et la liberté avec force au lieu de parler de soldats. En conséquence, la guerre a éclaté et est tombée dans le chaos, faisant souffrir la société humaine dans la misère et la souffrance. . Les contradictions se complètent et s'il y a une lance, il y aura un bouclier, afin que nous puissions éviter les problèmes avant qu'ils ne surviennent. Le développement pacifique du monde est l'idéal commun de toute l'humanité. Personne ne peut l'arrêter et le détruire. Sinon, elle sera impitoyablement punie par l'histoire. La paix mondiale, le développement humain, le développement économique, le développement social et les diverses civilisations et traditions de toutes les nations et de tous les groupes ethniques doivent apprendre les uns des autres et apprendre des forces de chacun. Les pierres de la montagne peuvent être utilisées pour le jade. Bien sûr, nous devons résister à une civilisation erronée, irrationnelle et non moderne. Et critiquez, vous ne pouvez pas adorer et suivre aveuglément. Le développement de l'histoire humaine est très long et toutes sortes de races humaines et de compétitions sont inévitables. Sans concurrence et contradictions diverses, le monde n'existerait pas. La nature humaine et la raison, la liberté et la paix ne font aucun doute. Toute l'histoire de l'humanité n'est rien de plus que l'histoire du passage constant de la sauvagerie animale à la rationalité humaine, du royaume de la nécessité au royaume de la liberté. Peu importe comment l'histoire se développe ou évolue, peu importe comment le monde change, cette trajectoire reste la même. C'est aussi une erreur de penser que l'histoire humaine et le monde seront sombres et incolores, ou que les humains régresseront vers l'ancien modèle social. Le changement et le développement de la société ne sont pas influencés par la volonté subjective de qui que ce soit. Bien entendu, tout au long du long processus de l'histoire humaine, la ligne principale et la ligne latérale ont toujours été liées et il est difficile de les distinguer. L'économie est l'essentiel, mais elle ne contrôle pas tout. Sans les libertés fondamentales, les droits de l'homme et les autres structures et éléments politiques d'une société démocratique moderne, il est difficile pour l'économie de se développer de manière durable et prospère. Démocratie libérale et centralisation de l'autorité ne sont pas synonymes, mais chacune a ses propres avantages et inconvénients dans une certaine période et dans une certaine fourchette. Cependant, d'un point de vue historique à long terme, la liberté et la libération humaines sont le fondement de l'existence et du développement de toutes les sociétés, ainsi que le fondement du développement et de la survie humains. La rationalité libre finira par prévaloir.

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.....L'hypothèse de l'hiver nucléaire (Nuclear winter) est une théorie sur le changement climatique global, elle prédit la catastrophe climatique qu'une guerre nucléaire à grande échelle pourrait produire. La théorie de l'hiver nucléaire estime que l'utilisation d'un grand nombre d'armes nucléaires, en particulier sur des cibles inflammables telles que les villes, permettra à une grande quantité

de fumée et de suie de pénétrer dans l’ atmosphère terrestre, ce qui peut entraîner un temps très froid. Il faut souligner que l'hiver nucléaire repose sur les hypothèses du modèle de données. Dans les dernières recherches, les scientifiques ont mis à jour des modèles de calcul plus précis que ceux du siècle dernier, et ont quand même conclu que l’ hiver nucléaire aurait un effet dévastateur sur le climat de la Terre.

La couche de particules de suie et de suie qui pénètre dans l'atmosphère peut réduire considérablement la quantité totale de lumière solaire atteignant le sol. Cette couche de particules est susceptible de rester dans l'atmosphère pendant des semaines, voire des années. Ces épais nuages noirs peuvent bloquer la plupart de la lumière du soleil pendant plusieurs semaines. Cela entraînera une baisse de la température de surface pendant cette période. Selon différents modèles, la température peut baisser de plusieurs dizaines de degrés Celsius.
Ce gel sombre et mortel, associé à de fortes doses de rayonnement de poussières radioactives, détruira gravement les plantes de cette région de la terre. Un froid intense, des radiations à haute dose, une destruction massive des installations industrielles, médicales et de transport, associées à des pénuries de nourriture et de récoltes, entraîneront des décès humains massifs dus à la famine, aux radiations et aux maladies. Les scientifiques pensent également que les oxydes d'azote de l'explosion détruiront la couche d'ozone. Les scientifiques ont observé cet effet auparavant inattendu dans des expériences d'explosion thermonucléaire. En raison de la régénération de la couche d'ozone, cet effet sera affaibli. Mais l'effet d'une guerre nucléaire à grande échelle sera sans aucun doute encore plus grand. Les effets secondaires de l'appauvrissement de la couche d'ozone (et l'augmentation conséquente du rayonnement ultraviolet) seront très importants, affecteront de nombreuses grandes cultures humaines et détruiront également la chaîne alimentaire marine en tuant le plancton.

Guerre froide, guerre chaude, nouvelle guerre froide, nouvelle guerre chaude, guerre mondiale, guerre nucléaire, guerre des étoiles
La guerre froide (anglais: Cold War, russe: Холодная Война) fait référence au conflit entre le camp capitaliste dominé par les États-Unis et l'Organisation du Traité de l'Atlantique Nord et le camp socialiste dominé par l'Union soviétique et le Pacte de Varsovie entre 1947 et 1991. Luttes politiques, économiques et militaires.
Le 5 mars 1946, l'ancien Premier ministre britannique Winston Churchill prononça le «discours du rideau de fer» à Fulton aux États-Unis, déclenchant officiellement la guerre froide. Le 12 mars 1947, le trumanisme américain est arrivé au pouvoir, marquant le début de la guerre froide. L'établissement du Pacte de Varsovie en 1955 a marqué la formation d'un modèle bipolaire. La dissolution du Traité de Varsovie en 1991 et la désintégration ultérieure de l'Union soviétique ont démontré l'échec du modèle soviétique, marquant la fin de la guerre froide et la fin du modèle bipolaire, qui a duré 44 ans. Les États-Unis sont devenus la seule superpuissance au monde et la structure mondiale est devenue "une superpuissance, de nombreuses puissances" dans le processus de multipolarisation mondiale. C'est un phénomène temporaire, les États-Unis et l'Europe ne deviennent pas une hégémonie, la Chine a commencé à se

développer et à le remplacer progressivement. Dans l'histoire du monde, les guerres froides et chaudes de ce type ne manquent pas, qui sont différentes des guerres chaudes et froides modernes. Elles sont principalement causées par le développement social, le développement scientifique, le développement culturel et le développement d'armes. L'ampleur de sa confrontation et la portée et le contenu de l'échelle sont assez différents. Il y avait des guerres chaudes et froides similaires dans les temps anciens, avec des connotations et des échelles différentes.

A cette époque, les États-Unis et l'Union soviétique étaient tous deux des "superpuissances" dans le monde. Afin de lutter pour l'hégémonie mondiale, les deux pays et leurs alliés se sont battus pendant des décennies. Pendant cette période, bien que les différends et les conflits aient été graves, les deux parties ont fait de leur mieux pour éviter le déclenchement d'une guerre mondiale à grande échelle (troisième guerre mondiale). La confrontation implique généralement des guerres locales par procuration, des courses technologiques et aux armements, des courses spatiales, des compétitions diplomatiques, etc. Elle a été menée de manière «froide», c'est-à-dire «de confinement mutuel et sans force», c'est pourquoi on l'appelle «guerre froide».

La guerre froide s'est principalement manifestée par une confrontation entre deux grands blocs militaires dirigés par les États-Unis et l'Union soviétique. La rivalité entre les deux superpuissances des États-Unis et de l'Union soviétique est la principale source de troubles à long terme dans le monde. Les deux principaux blocs militaires sont d'égale force et aucun des deux n'ose facilement utiliser la force pour mettre fin à la lutte de l'adversaire pour l'hégémonie mondiale. Les deux pays ont stocké un grand nombre d'ogives nucléaires et se sont mutuellement assurés de la destruction. Après la fin de la guerre froide, associée aux tribulations de la Première Guerre mondiale et de la Seconde Guerre mondiale précédentes, les peuples du monde entier aspirent à la paix et s'opposent à la guerre.

2. Les stratégies nucléaires ultimes des États-Unis et de la Russie sont toutes deux des stratégies de «destruction globale»; 2. Les puissances nucléaires ont construit un système de contre-attaque nucléaire automatisé - le «système de la main morte», qui peut automatiquement frapper les préréglages si l'organisation de commandement est éliminée. Bonne cible. C'est-à-dire qu'une fois que la plus haute autorité et le système de commandement du pays sont éliminés ou paralysés par une attaque nucléaire, le «système de la main morte» émettra automatiquement des codes nucléaires et des instructions de frappe nucléaire. Le système est connecté à des centaines de missiles intercontinentaux et peut attribuer automatiquement des cibles. Ce système ne distingue pas si la cible de l'attaque est la cible de l'attaque, mais frappe uniquement selon une procédure prédéterminée. Une fois qu'un pays lance un assaut nucléaire contre le chef et l'agence de commandement de la Russie, il activera le "système de la main morte", qui déclenchera définitivement une guerre nucléaire mondiale.

Données récentes du PNB (produit national brut) des pays du monde

Quels pays sont les plus grandes économies du monde en 2019? Voici une liste des dix principaux pays / régions ayant le PIB le plus élevé:

1. États-Unis (PIB: 21,41 billions)
2. Chine (PIB: 15,54 billions)
3. Japon (PIB: 5,36 billions)
4. Allemagne (PIB: 4,42 billions)
5. Inde (PIB: 3,16 billions)
6. France (PIB: 3,06 billions)
7. Royaume-Uni (PIB: 3,02 billions)
8. Italie (PIB: 2,26 billions)
9. Brésil (PIB: 2,26 billions)
10. Canada (PIB: 1,91 billion)

En 2018, il n'y avait que quatre pays dans le monde avec un PIB par habitant supérieur à 100000 USD. Ces pays sont Monaco (le plus élevé à 166 285 $ US), le Liechtenstein, le Luxembourg et les Bermudes. Ces pays sont connus pour attirer des résidents aisés et de très petites populations, avec des populations allant de 38 155 (Liechtenstein) à 590 321 (Luxembourg). Au contraire, avec seulement 247 dollars, le Sud-Soudan a le PIB par habitant le plus bas du monde, et de nombreux pays, principalement en Afrique, ont un PIB par habitant inférieur à 1 000 dollars.

Selon les données des Nations Unies et du Fonds monétaire international, les États-Unis ont le PIB le plus élevé du monde, avec respectivement 20 400 milliards de dollars (FMI) et 18 600 milliards de dollars (ONU). Le deuxième PIB le plus important est celui des 14,1 billions de dollars américains (FMI) et 11,2 billions de dollars américains (ONU) de la Chine. Cependant, les États-Unis ont une population de 327 millions d'habitants, tandis que la population chinoise est la plus élevée au monde, avec 1,42 milliard (malgré un écart important, les États-Unis ont également la troisième plus grande population du monde, juste derrière les 1,35 milliard d'Inde.

Parmi les cinq premiers pays affichant le PIB le plus élevé au monde, le Japon, l'Allemagne et le Royaume-Uni représentaient 5 167 050 dollars EU, 4 211 640 dollars EU et 2 936 290 milliards de dollars EU (d'après les données du FMI). De nombreux pays insulaires sont répertoriés comme les pays ayant le PIB le plus bas. Tuvalu est le pays aux revenus les plus faibles du Commonwealth avec un produit intérieur brut de 43 millions de dollars américains, suivi de Nauru en Micronésie avec 114 millions de dollars américains et des Îles Marshall avec 205 millions de dollars américains. Sans surprise, ces îles ont une petite population et un PIB par habitant relativement faible, allant de 3 810 dollars EU (Tuvalu) à 10 078 dollars EU (Nauru).

Le PIB mondial est la somme du revenu national brut de chaque pays du monde. Le revenu national brut représente le PIB d'un pays, augmentant la valeur des revenus d'importation et soustrayant la valeur de la monnaie d'exportation. La valeur du revenu national brut (RNB) est différente de la valeur du PIB car elle reflète l'impact du commerce intérieur et international.

En ajoutant le revenu national brut de tous les pays du monde, la valeur des importations et des exportations atteindra un équilibre. L'économie mondiale comprend 193 économies, dont les États-Unis sont la plus grande.
Première Guerre mondiale:

De 0% à 70%, la perte totale de matériaux des pays participants a atteint 4 billions de dollars américains.

La Seconde Guerre mondiale a été la guerre la plus destructrice de l'histoire. Rien qu'en Europe, les pertes matérielles causées par les dommages de guerre (selon des statistiques incomplètes) s'élevaient à 260 milliards de dollars américains (sur la base des valeurs de 1938); les dépenses militaires directes des pays belligérants représentaient 60 à 70% de leur revenu national brut. Plus de 16,9 millions de personnes sont mortes dans l'armée, et plus de 34,3 millions d'habitants sont morts. Le nombre total de morts s'élevait à plus de 51,2 millions. L'Union soviétique en comptait à elle seule plus de 20 millions.

Selon les estimations de la Banque mondiale, le PIB nominal mondial en 2017 était de 80683,79 milliards de dollars américains. En 2018, le PIB nominal mondial en 2018 était de 8,4835,46 milliards de dollars US, et il devrait être de 88 081,13 milliards de dollars US en 2019. En 2018, le taux de croissance du PIB mondial était de 3,6%.
Politique mondiale, culture, science et technologie, commerce mondial, diplomatie, territoire, sphère d'influence, éducation, religion, militaire
Les dix premiers pays du monde baiGDP (données en 2018, unité: dollar américain zhi) sont les suivants:

L'océan est le trésor de l'univers. L'océan est une perle brillante incrustée dans la terre. Les astronautes ont aperçu la terre depuis l'espace et ont découvert l'océan bleu. Il y a des tranchées sur la Lune et sur Mars, mais malheureusement il n'y a pas d'eau. De nombreuses planètes ont des mers, mais manquent d'eau ou ont disparu. Les humains, les animaux et les plantes mourront sans eau. L'océan est si important, tout comme les ressources marines. Ce livre ne discute pas de l'océanographie, mais discute des fantômes dans l'océan - sous-marins nucléaires et bombardiers stratégiques, missiles nucléaires terrestres, etc. (guerre nucléaire et guerre spatiale, etc.). Sont-ils totalement différents et totalement hors de propos? Je pense que les deux sont complètement différents, ce qui n'est pas mal. Cependant, les sous-marins nucléaires sont étroitement liés à l'océan et sont difficiles à quitter. L'océan engendre tout, et les sous-marins nucléaires sont également utilisés pour grandir, laisser passer le flux. L'océan est une ressource naturelle et les sous-marins nucléaires sont fabriqués par l'homme plutôt que par le paradis. En naviguant dans l'océan et en naviguant avec des sous-marins nucléaires, les sous-marins nucléaires peuvent défendre et détruire l'océan. Par exemple, si une guerre nucléaire déclenche une grande explosion sur la Terre, l'océan peut-il encore exister? Même s'il existe, il sera complètement pollué et empoisonné. En un mot, l'océan est également détruit. Une guerre nucléaire locale polluera également l'océan. Par conséquent, ce

livre se concentre sur ce dernier. Par conséquent, les fantômes dans les sous-marins nucléaires de haute mer et les véhicules de bombardement stratégique, les missiles nucléaires terrestres, etc. (guerre nucléaire et guerre spatiale, etc.) sont au centre de ce livre, et c'est un sujet très important. , Pas moins que l'importance des ressources marines, cela va de soi. La raison pour laquelle ils sont considérés ensemble est que les deux sont étroitement liés, la vie et la mort. Bien sûr, la paix, la liberté et la rationalité sont le thème de l'humanité et du développement dans le monde depuis des milliers d'années. Peu importe la façon dont le monde change et évolue, ou comment l'ordre mondial est chaotique ou réorganisé, la paix mondiale et la rationalité libérale sont les plus puissantes. C'est le but de ce livre.

Le PIB des États-Unis en 2018 a atteint 20,51 billions de RMB, et la Chine équivaut à environ 65% du PIB des États-Unis en 2017.

Il s'agit également du ratio le plus élevé de la production économique totale des autres pays par rapport à celui des États-Unis après la Seconde Guerre mondiale. Le PIB du Japon et de l'Union soviétique a tous deux atteint 60% de la production économique totale des États-Unis, avant de reculer. En attendant la compétition ou l'affrontement, la guerre est parfois inévitable. Bien sûr, la concurrence libre, pacifique et rationnelle est la norme. La raison libre et pacifique est
L'inévitabilité de l'histoire. Même s'il y a une guerre, quelle que soit l'issue de la guerre, il y aura toujours une concurrence libre, pacifique et rationnelle après la guerre.
La loi d'airain de l'histoire. En compétition ou en confrontation, l'importance de la force va de soi. Porte-avions, bombe nucléaire, bombardier stratégique, sous-marin nucléaire, espace
Armes et ainsi de suite. Cependant, l'économie est le fondement de tout: sans billets de banque, la machine de guerre fonctionne et la guerre ne peut se maintenir.
Tenez et gagnez. Par conséquent, l'économie est cruciale. Avant et après la guerre, pendant la guerre, l'économie était très cruciale. Une grande échelle
La guerre, les armes stratégiques, les matériaux stratégiques et les coûts de guerre sont tous incommensurables. Nouvelle politique mondiale, économie mondiale, science et technologie, culture et éducation, armes et équipement, croyances religieuses et sociales, mode de gestion sociale, structure sociale, échanges commerciaux, développement spatial (lune, Mars, etc.), la société humaine est étroitement liée et les capitaux circulent dans le monde entier. Le commerce, les chaînes industrielles, les marchés mondiaux, les profits, les investissements, etc., la mondialisation, la commercialisation, etc., se font concurrence plus férocement entre les pays, présentant même les caractéristiques d'une nouvelle guerre froide et d'une nouvelle guerre chaude. L'Est et l'Ouest sont étroitement intégrés, et une séparation et un découplage économiques complets sont difficiles à réaliser. Le capital est à la recherche de profit. L'économie de marché libre, l'économie de marché semi-libre, l'économie fermée (économie planifiée), la structure sociale ouverte, la structure sociale semi-ouverte, la structure sociale fermée, etc. nécessitent une compréhension et un jugement clairs.

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Chine
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PNB dans tous les pays du monde
(
pays
Les moyens de subsistance des gens
Produire
Valeur totale)
récent
nombre
Selon les États-Unis

Chine
Japon
Allemagne

The ghost of the deep sea --- a nuclear submarine cruising in the four oceans (Fangruida)

Nuclear submarine attacks, strategic bombers, land-based nuclear missiles and space warfare
--------Modern war and future war (new cold war and hot war)The ocean is the heart of the earth, and the ocean is the cradle of life on the earth.
Fangruida 2014v 2.2 English version 2017v1.3 electronic revision

This is an important work by Fang Ruida, originally created in 2014, and the current author has revised it again, partially rewritten or rewritten, published and distributed to satisfy the reading of netizens and readers around the world. There may be omissions and errors in the compilation of this book, which will be revised when it is reprinted.
Translation school editor Lasco. H

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***Атомные подводные атаки, стратегические бомбардировщики, наземные ядерные ракеты и космическая война
-------- Современная война и будущая война (новая холодная война и горячая война)
Призрак глубокого моря - атомная подводная лодка,курсирующая в четырех океанах

Океан-это сердце земли,а океан-колыбель жизни на земле.
Fangruida 2014v 2.2 Английская версия 2017v1.3 электронная версия
Редактор школы переводов Ласко.ЧАС
********** **********
В современном мире наука и техника стремительно развиваются, строительство стран в мире меняется с каждым днем, а глобальный объем производства достиг 80 триллионов долларов США. Мир во всем мире-первая гарантия.Основная задача

Организации Объединенных Наций - противостоять войне и поддерживать безопасность во всем мире и мир во всем мире. В условиях экономического развития различных стран, торговли и торговли, распространения культурной информации, улучшения образования и т. Д., Конкуренции за ресурсы, конкуренции за преимущества, конкуренции за землю, конкуренции за пространство и т. Д. Страны мира более тесно связаны. В то же время конкуренция между странами в мире стала более интенсивной, различные соревнования стали более частыми, и различные конфликты становятся все более заметными. Время от времени в мире будет тень войны, и даже будут различные противостояния. Подготовка и расходы стран по всему миру также существенно возрастают. Могут возникнуть войны и даже ядерные войны (биохимическое оружие и т. Д., Космические войны и т. Д.). Конечно, мир во всем мире всегда был основным направлением, и окончание войны будет неосновным. Однако войны разрушительны и могут даже уничтожить землю и человечество. Например, ядерные войны не являются паникерскими. Люди мира должны дорожить миром и противостоять всевозможным несправедливым и нечеловеческим умам и рациональным войнам. Поэтому все человечество решает противостоять различным несправедливым и нечеловеческим интеллектуальным и рациональным войнам, а также защищать и защищать мир во всем мире. Однако это не значит, что мир мирный. Если вы сможете расслабиться и расслабиться, вы потеряете бдительность. Например, трагедии Первой и Второй мировых войн повторятся. Это неизбежно, что в мире есть сумасшедшие и безумцы, в противном случае произойдут крупные бедствия. Люди убивают и нападают друг на друга как примитивные животные,

которые еще более ужасны в 21-м и 22-м веках, такие как ядерные бомбардировки, космическая война, биологическое и химическое оружие, вирусное оружие и так далее. Атомные бомбы, атомные подводные лодки, стратегические бомбардировщики, наземные ядерные ракеты, противоспутниковое оружие и т.Д. Должны обладать достаточным пониманием и осознанием этого, что очень поможет знаниям и информации людей, сохранит мир во всем мире и «запретит ядерное оружие». ». Постепенное уничтожение всего ядерного, биологического и химического оружия стало первым выбором. Мирное использование ядерной энергии на благо человечества, а не обращение к войне и ядерной войне. Конечно, мы не можем говорить об обесцвечивании тигра, душа напугана ядерной войной. Ядерный баланс, ядерное сдерживание, миролюбивые усилия и борьба всего человечества, высшая свобода и разумная мудрость человечества и т. Д. Имеют важнейшее значение для предотвращения ядерной войны. Поддержание жизни и благополучия людей на земле превыше всего, превыше всего. Мы всегда верим, что эпоха полного запрещения и уничтожения всего ядерного, биологического и химического оружия обязательно наступит. Мы не должны быть пессимистичными и разочарованными, не говоря уже о том, чтобы уклоняться от самих себя, и мы должны действовать смело. Будущее мира принадлежит всему человечеству. Мир во всем мире и человеческое счастье - единственный выбор и цель человечества. Люди не могут ослабить свою бдительность, чтобы предотвратить крупные войны и защитить мир во всем мире. В то же время они должны также повышать свою осведомленность, чтобы сохранять мир и свободу силой, а не говорить о солдатах. В результате война разразилась и превратилась в хаос, в результате чего

человеческое общество понесло страдания и страдания.,Противоречия дополняют друг друга,и если есть копье,то появится щит,чтобы мы могли предотвратить проблемы до того,как они возникнут.Мирное развитие мира является общим идеалом всего человечества.Никто не может остановить и уничтожить это.В противном случае он будет безжалостно наказан историей.Мир во всем мире,человеческое развитие,экономическое развитие,социальное развитие и различные цивилизации и традиции всех наций и этнических групп должны учиться друг у друга и учиться у сильных сторон друг друга.Камни горы можно использовать для нефрита.Конечно,мы должны противостоять неправильной,неразумной и не современной цивилизации.И критикуйте,вы не можете слепо поклоняться и следовать.Развитие человеческой истории очень долгое,и все виды человеческих рас и соревнований неизбежны.Без конкуренции и различных противоречий мир не существовал бы.Есть вред。Природа человека и разум,свобода и мир не подлежат сомнению.Вся история человечества есть не что иное,как история постоянного перехода от животной дикости к человеческой рациональности,от царства необходимости к царству свободы.Неважно,как история развивается или развивается,как бы ни менялся мир,эта траектория остается неизменной.Также ошибочно думать,что человеческая история и мир будут безрадостными и бесцветными или что люди будут возвращаться к старой социальной модели.Изменения и развитие общества не движимы чьей-либо субъективной волей.Конечно,на протяжении длительного процесса человеческой истории основная линия и побочная линия всегда были переплетены,и между ними трудно различить.Экономика-это главное,но она не контролирует все.Без основных свобод,прав

человека и других политических структур и элементов современного демократического общества экономике трудно развиваться устойчиво и процветающе.Либеральная демократия и централизация защиты прав не являются синонимами,но в течение определенного периода и в пределах определенного диапазона каждый из них имеет свои преимущества и недостатки.Однако с долгосрочной исторической точки зрения свобода и освобождение человека являются основой существования и развития всех обществ,а также основой человеческого развития и выживания. В конечном итоге свободная рациональность возобладает.

Океан - это сокровище вселенной. Океан - это сверкающая жемчужина земли. Космонавты обозревали Землю из космоса и обнаружили синий океан.На Луне и Марсе есть окопы,но,к сожалению, нет воды.Многие планеты имеют моря,но испытывают недостаток воды или исчезли. Люди, животные и растения умрут без воды. Океан так важен, как и морские ресурсы. Эта книга не обсуждает океанографию,но обсуждает призраков в океане - атомные подводные лодки и стратегические бомбардировщики, ядерные ракеты наземного базирования и т. Д. (Ядерная война и космическая война и т. Д.). Это совсем другое и совершенно неактуально? Я думаю,что два совершенно разные, что не плохо. Однако атомные подводные лодки тесно связаны с океаном и их трудно покинуть. Океан порождает все, и атомные подводные лодки также используются,чтобы расти,чтобы поток ушел. Океан является природным ресурсом, и атомные подводные лодки созданы человеком,а не небесами. Перемещаясь по океану и совершая круизы на атомных подводных лодках, атомные подводные

лодки могут защищать и разрушать океан. Например, если ядерная война спровоцирует большой взрыв на земле, может ли океан все еще существовать? Даже если он существует, он будет полностью загрязнен и отравлен. Одним словом, океан тоже разрушен. Местная ядерная война также загрязнит океан. Поэтому в этой книге основное внимание уделяется последнему, поэтому призраки в глубоком море - атомные подводные лодки и стратегические бомбардировщики, ядерные ракеты наземного базирования и т. Д. (Ядерная война и космическая война и т. Д.) Находятся в центре внимания этой книги, и это очень важная тема. Не менее, чем важность морских ресурсов, это само собой разумеющееся. Причина, по которой они рассматриваются вместе, заключается в том, что они тесно связаны, жизнь и смерть. Конечно, мир, свобода и рациональность являются темой человечества и основным направлением развития в мире на протяжении тысячелетий. Независимо от того, как мир меняется и развивается, или как мировой порядок хаотичен или реорганизован, мир и либеральная рациональность мира являются наиболее мощными. Это цель этой книги.

Гипотеза о ядерной зиме (Nuclear winter) - это теория о глобальном изменении климата, она предсказывает климатическую катастрофу, которую может привести к масштабной ядерной войне. Теория ядерной зимы считает, что использование большого количества ядерного оружия, особенно на легковоспламеняющихся объектах, таких как города, позволит большому количеству дыма и сажи проникать в атмосферу Земли, что может привести к очень холодной погоде. Следует отметить, что ядерная зима основана на допущениях модели данных. В последних исследованиях ученые

обновили расчетные модели, которые являются более точными, чем в прошлом веке, и все же пришли к выводу, что ядерная зима будет иметь разрушительные последствия для климата Земли.

Слой частиц сажи и сажи, попадающий в атмосферу, может значительно уменьшить общее количество солнечного света, достигающего земли. Этот слой частиц может оставаться в атмосфере в течение недель или даже лет. Эти густые черные облака могут блокировать большую часть солнечного света на срок до нескольких недель. Это приведет к падению температуры поверхности в течение этого периода. Согласно различным моделям, температура может упасть до десятков градусов Цельсия.

Этот темный и смертоносный мороз в сочетании с высокими дозами радиации от радиоактивной пыли сильно уничтожит растения в этой области Земли. Сильные холода, высокие дозы радиации, обширные разрушения промышленных, медицинских и транспортных средств в сочетании с нехваткой продовольствия и сельскохозяйственных культур приведут к массовой гибели людей в результате голода, радиации и болезней. Ученые также считают, что оксиды азота от взрыва разрушат озоновый слой. Ученые уже наблюдали этот неожиданный эффект в экспериментах по термоядерному взрыву. Из-за регенерации озонового слоя этот эффект будет ослаблен. Но эффект от полномасштабной ядерной войны, несомненно, будет еще больше. Вторичные эффекты истощения озонового слоя (и последующего увеличения ультрафиолетового излучения) будут очень значительными: они затронут многие основные культуры человека, а также разрушат морскую пищевую цепь, убив планктон.

Холодная война, горячая война, новая холодная война, новая горячая война, мировая война, ядерная война, звездные войны

Холодная война (англ .: Cold War, русский: Холодная война) относится к конфликту между капиталистическим лагерем, в котором доминируют Соединенные Штаты, и Организацией Североатлантического договора, и социалистическим лагерем, в котором доминируют Советский Союз и Варшавский договор между 1947 и 1991 гг. Политическая, экономическая и военная борьба. [1]

5 марта 1946 года бывший премьер-министр Великобритании Уинстон Черчилль выступил с речью «Железный занавес» в Фултоне в Соединенных Штатах, официально начав холодную войну. 12 марта 1947 года к власти пришел американский труманизм, ознаменовавший начало холодной войны. Создание Варшавского договора в 1955 году ознаменовало формирование биполярного паттерна. Распад Варшавского договора в 1991 году и последующий распад Советского Союза продемонстрировали несостоятельность советской модели, ознаменовавшую окончание холодной войны и конец биполярного режима, который длился 44 года. Соединенные Штаты стали единственной сверхдержавой в мире, а мировая структура стала «одной сверхдержавой, множеством держав» в процессе многополяризации мира. Это временное явление. Соединенные Штаты и Европа не становятся гегемоном. Китай начал расти и постепенно вытеснять его. В мировой истории нет недостатка в холодных и горячих войнах такого рода, которые отличаются от современных холодных и горячих войн, в основном они обусловлены социальным развитием, научным развитием, развитием культуры и разработкой оружия. Масштаб его противостояния, а также

масштаб и содержание шкалы весьма различны. В древние времена были такие же горячие и холодные войны, с различными коннотациями и масштабами.
В то время Соединенные Штаты и Советский Союз были "сверхдержавами" в мире. Чтобы бороться за мировую гегемонию, две страны и их союзники сражались десятилетиями. В течение этого периода, хотя различия и конфликты были серьезными, обе стороны старались изо всех сил избегать начала крупномасштабной мировой войны (Третья мировая война). Конфронтация обычно проходила через локальные войны по доверенности, гонки технологий и вооружений, космические гонки, дипломатические соревнования и т. Д. Он был осуществлен «холодным» способом, то есть «взаимным сдерживанием и отсутствием силы», поэтому его называют «холодной войной».
Холодная война в основном проявлялась как противостояние двух крупных военных блоков, возглавляемых США и Советским Союзом. Соперничество между двумя сверхдержавами США и Советского Союза является основным источником долгосрочных волнений в мире. Два главных военных блока имеют равную силу, и ни один из них не осмеливается легко использовать силу, чтобы положить конец борьбе противника за мировую гегемонию. Обе страны накопили большое количество ядерных боеголовок и взаимно заверили друг друга

Призрак глубокого моря - атомная подводная лодка, курсирующая в четырех океанах (Фангруида)

Атомные подводные атаки, стратегические бомбардировщики, наземные ядерные ракеты и космическая война

-------- Современная война и будущая война (новая холодная война и горячая война) Океан - это сердце земли, а океан - колыбель жизни на земле.

Fangruida 2014v 2.2 Английская версия 2017v1.3 электронная версия

Это важная работа Фанга Руиды, изначально созданная в 2014 году, и нынешний автор пересмотрел ее снова, частично переписал или переписал, опубликовал и распространил, чтобы удовлетворить читателей сети и читателей по всему миру. В сборнике этой книги могут быть упущения и ошибки, которые будут пересмотрены при перепечатке.

Редактор школы переводов Lasco. H

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……核潛艇攻擊，戰略轟炸機，陸基核導彈和太空戰

--------現代戰爭與未來戰爭（新冷戰與熱戰）

深海幽靈---游弋在四大洋的核潛艇

海洋是地球的心臟，海洋是地球生命的搖籃。

方瑞達2014v 2.2英文版2017v1.3電子版

翻譯學校編輯拉斯科。 H

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在現代世界中，科學技術飛速發展，世界各國的建設日新月異，全球產值已達80萬億美元。世界和平是第一保證。聯合國的首要任務是反對戰爭，維護世界安全與世界和平。隨著各國經濟的發展，貿易和貿易的發展，文化信息的傳播，教育的改善等，資源爭奪，優勢爭奪，土地爭奪，空間爭奪等，世界各國日益增多。更緊密的聯繫。同時，世界各國之間的競爭越來越激烈，各種競爭越來越頻繁，各種衝突也越來越突出。有時，世界上會有戰爭的陰影，甚至會有各種對抗。世

界各國的準備和費用也大大增加。可能會發生戰爭，甚至核戰爭（生化武器等，太空戰爭等）。當然，世界和平一直是主流，戰爭的結束將不是主流。但是，戰爭是毀滅性的，甚至可能毀滅地球和人類。例如，核戰爭並非危言聳聽。世界人民必須珍惜和平，反對一切不公正，非人類的情報和理性戰爭。因此，反對各種不公正，非人類的知識分子和理性戰爭，維護和捍衛世界和平，是全人類的選擇。但是，這並不意味著世界是和平的。如果您可以高枕無憂，您將失去警惕。例如，第一次世界大戰和第二次世界大戰的悲劇將重演。世界上不可避免地有瘋子和瘋子，否則，將會發生重大災難。人類像原始動物一樣互相殘殺，在21和22世紀更加可怕，例如核彈襲擊，太空戰，生物和化學武器，病毒武器等。原子彈，核潛艇，戰略轟炸車，陸基核導彈，反衛星武器等，必須對此有足夠的了解和認識，這將極大地幫助人們的知識和信息，珍惜世界和平與“禁止核武器”。 ”。逐步銷毀所有核，生物和化學武器已成為第一選擇。和平利用核能造福人類，而不是訴諸戰爭和核戰爭。當然，我們不能談論被核戰爭嚇到的老虎的變色。核平衡，核遏制，全人類的愛好和平的努力和鬥爭，全人類的最高自由和理性智慧等，對於防止核戰爭至關重要。維護地球上人類的生命和福祉是至高無上的。我們始終認為，完全禁止和銷毀所有核，生物和化學武器的時代必將到來。我們一定不要悲觀和失望，更不要讓自己退縮，我們必須勇敢地採取行動。世界的未來屬於全人類。世界和平與人類幸福是人類的唯一選擇和目標。人類不能放鬆警惕，以防止發生重大戰爭並捍衛世界和平。同時，他們還必須提高認識，以力量保持和平與自由，而不是談論士兵。結果，戰爭爆發並陷入混亂，使人類社會遭受痛苦和苦難。 。矛盾是相輔相成的，如果有矛，就會有盾牌，這樣我們就可以在問題發生之前就加以預防。世界的和平發展是全人類的共同理想。沒有人可以阻止並摧毀它。否則，它將受到歷史的殘酷懲罰。世界和平，人類發展，經濟發展，社會發展以及所有民族和族裔的各種文明和傳統，必須相互學習，並相互學習。山上的石頭可以用來做玉。當然，我們必須抵制錯誤的，非理性的和非現代的文明。並批評，您不能盲目崇拜和跟隨。人類歷史的發展是由來已久的，各種各樣的人類競賽都是不可避免的。沒有競爭和各種矛盾，世界就不會存在。人類的天性和理性，自由和平勿容置疑。人類的整個歷史不外乎就是不斷從動物野性走向人類理性，從必然王國走向自由王國的歷史。不論歷史如何發展如何演變，不論世界變局如何，這條軌跡始終如一。那種認為，人類歷史和世界就會暗淡無色或者人類倒退回舊的社會模式，也是一種謬誤。社會的變革發展不以任何人的主觀意志為轉移，當然，整個漫長的人類歷史過程中，正線和副線始終交織在一起，難捨難分，高低難定，毫不為怪。經濟是主要，但並不以此可以統御一切。沒有基本的自由人權等現代民主社會的政治構造和要素，經濟也難以發展為繼和昌盛不衰。自由民主和集權威權不是同義語，僅管在一定時期和一定範圍內，各有各自的優劣之比。但從長遠歷史看，人的自由和解放是一切社會存在和發展的根本，也是人類發展生存的底線，自由理性終將勝出。Human nature and reason, freedom and peace are beyond doubt. The entire history of mankind is nothing more than the history of constantly moving from animal wildness to human reason, from the kingdom of necessity to the kingdom of freedom. No matter how history develops or evolves, no matter how the world changes, this trajectory remains the same. It is also a fallacy to think that human history and the world will be bleak and colorless, or that humans will regress to the old social model. The change and development of society are not shifted by anyone's subjective will. Of course, throughout the long process of human history, the main line and the side line have always been intertwined, and it is hard to distinguish between them. The economy is the main thing, but it does not control everything. Without basic freedoms and human rights and other political structures

and elements of a modern democratic society, it is difficult for the economy to develop sustainably and prosperously. Liberal democracy and centralization of authority are not synonymous, but each has its own advantages and disadvantages within a certain period and within a certain range. However, from a long-term historical perspective, human freedom and liberation are the foundation of the existence and development of all societies, as well as the bottom line of human development and survival. Free rationality will eventually prevail.

海洋是宇宙的瑰寶。海洋是鑲嵌在地球的璀璨的燦爛明珠。宇航員在太空俯瞰地球，發現蔚藍色的海洋。月球有海溝，火星也有，可惜沒有水。好多星球有海，但缺乏水，或已消失了。人類和動植物，沒有水會死亡滅絕。海洋如此重要，海洋資源也是如此。本書並不討論海洋學，而是探討研究海洋中的幽靈-------核潛艇以及戰略轟炸飛行器陸基核導彈等（核大戰和太空戰等）。是否南轅北轍，完全風馬牛不相及呢？我以為，二者是截然不同的，這並不錯。但是，核潛艇又和海洋息息相關，難以脫離。海洋滋生萬物，核潛艇也應用而生，順其自然。海洋屬於自然資源，核潛艇則屬於人造而不是天造地設。航洋游弋核潛艇，核潛艇可以保衛海洋也能夠毀滅海洋，比如，核大戰引發地球大爆炸，海洋還能存在嗎？即使存在，也會被徹底污染毒化。一言以蔽之，海洋也毀滅了。局部核戰，也會污染海洋。所以，本書重點探討後者，所以，深海中的幽靈---核潛艇以及戰略轟炸飛行器陸基核導彈等（核大戰和太空戰等等）這是本書的重點，它是十分重要的話題，並不亞於海洋資源的重要性，這也是不言而喻的。之所以把它們聯合起來考量，二者緊密相關，生死存亡。當然，和平自由理性是人類的主題也是世界千萬年的發展主流，不論世界如何變化演變，世界秩序如何混亂或重組，世界和平和自由理性是最強大的。這是本書的宗旨所在，一語破的。

核 冬天 假说 （Hiver nucléaire） 是 一個 關於 全球 氣候 變化 的 理論 ， 它 預測 了 一場 大規模 核 戰爭 可能 產生 的 氣候 災難。 核 冬天 理論 認為 使用 大量 的 核武器 ， 易燃 是 對 像 城市 的 的 是 對 像 城市 這樣 的Å ，更 精确 的 计算 模型 ， 依然 得出 结论 核 冬天 会对 地球 气候 造成 毁灭性 影响。

進入 大氣層 的 煙 和 煤煙 的 顆粒 層 可以 顯著 減少 到達 地面 的 陽光 總量 ， 這個 顆粒 層 很 可能 在 大氣 中 停留 數 週 甚至 數 年。 這些 厚 的 黑雲 可以 遮擋 掉 大部分 的 陽光 ， 時間 長達數 週。 這 將 導致 地表 溫度 在 這一 時期 下降 ， 根據 不同 的 模型 ， 溫度 下降 最多 可達 數十 攝氏度。
這種 黑暗 與 致命 的 霜凍 ， 再加 上 來自 放射性 塵埃 的 高 劑量 輻射 ， 會 嚴重 地 毀滅 地球 上 這個 地區 的 植物。 嚴寒 、 高 劑量 輻射 、 工業 、 醫療 、 運輸 設施 被 廣泛 破壞 ， 再加 上 食和 農作物 的 短缺 ， 將會 導致 因 饑荒 、 輻射 和 疾病 引起 的 人類 大規模 死亡。 科學的 還 認為 爆炸 產生 的 氮 氧化物 將 破壞 臭氧層。 科學的 已經 在 熱 核爆炸 實驗 中 觀察 到 了 這種 此前 未曾 預料 過的 效應。 由於 臭氧層 的 再生 ， 這種 效應 會 被 削弱 了。 但是 一場 全面 核 戰爭 的 效應 ， 毫無 疑問 將會 更加 巨

大。 臭氧 耗盡 （以及 隨之 而來 的 紫外線 輻射 增加） 的 次生 效應將 非常 顯著 ， 它 會對 人類 多種 主要 農作物 產生 影響 ， 也會 通過 殺死 浮游生物 而 毀壞 海洋 食物鏈。

冷战 ， 热 战 ， 新 冷战 ， 新 热 战 ， 世界大战 ， 核 大战 ， 星球大战
冷战 （英语 ： Guerre froide ， 俄语 ： Холодная Война） 是 指 1947 年 至 1991 年 之间 ， 一 、 北大西洋公约组织 为主 的 资本主义 阵营 ， 与 苏联 、 华沙 条约 组织 为主 的 社会主义 阵营 之间 的政治 、 经济 、 军事 斗争。
1946 年 3 月 5 日 ， 英国 前 首相 温斯顿 • 丘吉尔 在 的 富尔顿 发表 «铁幕 演说» ， 正式 拉开 了 冷战 序幕。 1947 年 3 月 12 日 ， 的国 杜鲁门 主义 上台 ， 标志着 冷战 开始。 1955 年华 沙 条约 组织 成立 标志着 两极 格局 的 形成。 1991 年华 约 解散 ， 之后 苏联 解体 ， 说明 了 苏联 模式 的 失败 ， 标志着 冷战 结束 ， 同时 也 标志 两极 格局 结束 ， 前后 共 44 年。 的国 成为 成为Δ ， 也 不乏 这种 那种 的 冷战 和 热 战 ， 所 不同于 现代 的 冷热 战 ，， 主要 是 社会 发展 ， 科学 发展 ， 文化 发展 ， 武器 发展 等 原因 所致。 其 规模 其 对抗 等 范围 和 规模 内容 有很大 不同。 古代 也 有 类似 的 冷热 战 ， 内涵 和 规模 范围 不同。
当时 的 的国 和 苏联 同 为 世界 上 的 “超级大国” ， 为了 争夺 世界 霸权 ， 两国 及 其 盟国 展开 了 数 十年 的 斗争。 在 这段 时期 ， 虽然 分歧 和 冲突 严重 ， 但 双方 都 尽力 避免 世界范围 的 大规模 战争 （第三 次 世界大战） 爆发 ， 其 对抗 通常 通过 局部 代理 战争 、 科技 和 军备竞赛 、 太空 竞赛 、 外交 竞争 等 «冷» 方式 进行 ， 即 «相互 遏制 ， 不 动 武力» ， 因此称之为 «冷战»。
冷战 主要 表现 为 以 的国 与 苏联 为首 的 两大 军事集团 之间 的 对峙。 的苏 两个 超级 大国 之间 的 争夺 ， 是 世界 长期 不得 安宁 的 主要 根源。 两大 军事集团 实力 相当 ， 谁都 不敢轻易 动用 武力 来 结束 对方 与其 的 世界 霸权 争夺。 两国 都 储存 了 大量 核 弹头 ， 彼此 相互 保证 毁灭。 冷战 结束 后再 加上 经历 了 之前 的 第一次世界大战 和 第二次世界大战 的 磨难 ， 世界 各国人民 都 渴望 和平 、 反对 战争。

、 的国 和 俄国 的 终极 核 战略 都是 “全球 毁灭” 战略 ； 二 、 核大国 建 有 自动化 核 反击 体系 ——“死 手 系统” ， 即 在 首脑 指挥 机关 被 消灭 的 情况 下 ， 可 自动 打击 预先 设好的 打击 目标。 也就是说 ， 一旦 国的 最高 首长 机关 和 指挥 体系 被 核 突击 消灭 或 瘫痪 的 话 ， «死 手 系统» 将 自动 发出 核 密码 及 核 打击 指令。 该 系统 与 数百 枚 洲际导弹 相连， 可以 自动 分配 打击 目标。 此 系统 不会 分辩 打击 的 目标 是 不是 攻击 的 目标 ， 只是 按照 预定 程序 打击。 一旦 某个 国的 对 俄罗斯 首脑 和 指挥 机关 发动 核 突击 ， 就会 把 “死 手 系统” 激活， 那 将 肯定 触发 全球 核 大战。

世界 各国 PNB (国民 生产 总值) 最近 数据
2019 年 世界 上 最大 的 经济 体 是 哪些 国的？ 以下 是 GDP 最高 的 前 十个 国的 / 地区 的 列表 ：
1. 美国（PIB ： 21,41 万亿）
2. 中国 （PIB ： 15,54 万亿）
3. 日本 （PIB ： 5,36 万亿）
4. 德国 （PIB ： 4,42 万亿）
5. 印度 （PIB ： 3,16 万亿）
6. 法国 （PIB ： 3,06 万亿）
7. 英国 （PIB ： 3,02 万亿）
8. 意大利 （PIB ： 2,26 万亿）
9. 巴西 （PIB ： 2,26 万亿）
10. 加拿大 （PIB ： 1,91 万亿）
截至 2018 年 ， 世界 上 只有 四个 国的 的 人均 PIB 超过 100,000。 这些 国的 是 摩纳哥 （最高 ， 为 166,285 一元） ， 列支敦士登 ， 卢森堡 和 百慕大 ， 这些 国的 都 以 吸引 富裕 的 居民 以及 人口 非常 非常人口 从 38,155 （列支敦士登） 到 590,321 （卢森堡）。
相反 ， 在 仅仅 247 $ ， 南部 苏丹 拥有 世界 的 的 GDP 最低 的 ， 许多 国
根据 联合国 和 国际货币基金组织 的 数据 ， 的国 拥有 世界 上 最大 的 PIB ， 分别 为 20,4 万亿 的元 （FMI） 和 18,6 万亿 一元 （UN）。 第二 大 GDP 是 中国 的 14.1 万亿 ৳ 元 （FMI） 14.2于 印度 13,5 亿。
在 全球 国 英国, 7 50国国 中 收入 最低 的 国的 ， 其 国内 生产 总值 为 4,300 万 的元 ， 其次 是 密 克罗尼西亚 的 瑙鲁 岛 ， 为 1.14 亿 的元 ， 马绍尔群岛 为 2.05 亿 的元。 不足为奇 的 是 ， 这些 岛屿 人口少 ， 人均 国内 生产 总值 也 相对 较低 ， 从 3,810 的 （图瓦卢） 到 10,078 ৳ （瑙鲁）。

世界 GDP 是 世界 上 每个 国的 国民 收入 的 总和。 国民 总 收入 占 一个 国的 的 的 将 进口 将 的 价值 增加 ， 并将 出口 的 的 价值 减去。 国民 总 收入 （GNI） 的 值 不同于 PIB 的 值 ， 因为 它 反映 了 国内 和 国际 贸易 的 影响。
将 世界 上 每个 国的 的 总 收入 加 在一起 ， 进出口 价值 就 达到 平衡。 世界 经济 包括 193 个 经济 体 ， 其中 一国 是 最大 的。
一 战 ：

0 % ～ 70 % ， 参战国 物资 总 损失 价值 达 4 万亿 的。

第二次世界大战 是 历史 上 破坏性 最大 的 一次 战争。 仅 在 欧洲 ， 战争 破坏 造成 的 物资 损失 （据 不完全统计） 即 达 2600 亿 的元 （按 1938 年 价值） ； 各 交战国 的 直接 军费 支出 占其 国民 总 收入 的 60—70 %。 军队 死亡 1690 余 万人 ， 居民 死亡 3430 余 万人 ， 合计 死亡 5120 余 万人 ， 仅 苏联 就 达 2000 余 万人。

据 世界银行 估计 ， 2017 年 世界 名义 PIB 为 80,6837,9 亿 的元。 2018 年 ， 2018 年 世界 名义 PIB 为 84 8354,6 亿 一元 ， 预计 2019 年 为 88,0811,3 亿 一元。 2018 年 ， 世界 PIB 的 增长率为 3,6 ％。
世界 政治 ， 文化 ， 科学 技术 ， 世界 贸易 ， 外交 ， 领土 ， 势力范围 ， 教育 ， 宗教 ， 军事
世界 前 十名 国的 baiGDP （2018 年 数据 ， 单位 ： 的 du 元 zhi） 如下 表 ：

中国 2018 年 的 PIB 达到 20,51 万亿 人民币 ， 中国 约 相当于 第 dao 名 的国 2017 年 PIB 的 65%。

也是 第二次世界大战 以后 ， 其他 国的 经济 总量 与 的国 相比 的 最高 比例 ， 日本 和 苏联 的 PIB 都曾 达到 过 的 经济 总量 的 60% ， 但 随后 就 陷入 了 一路 下滑。 等 竞争或 对抗 ， 战争 有时 是 难免 的 ， 当然 自由 和平 理性 竞争 是 主流 是 常态。 自由 和平 理性 是
历史 的 必然。 即使 发生 战争 ， 战争 不论 胜负 如何 ， 战争 之后 依然 是 自由 和平 理性 竞争 ， 这 是
历史 的 铁 律。 竞争 或 对抗 ， 武力 重要性 不言而喻。 航母 ， 核弹 ， 战略 轰炸机 ， 核潜艇 ， 太空
武器 等等 ， 不一而足。 但是 ， 经济 是 一切 的 基础 ， 没有 钞票 ， 战争 机器 运转 ， 战争 也 难以 维
持 和 取胜。 所以 ， 经济 是 至关重要 的。 战前 战后 ， 战争 过程 ， 经济 是 十分 关键。 一场 大规模
战争 ， 战略 武器 ， 战略 物质 ， 战争 耗费 ， 都是 不可估量 的。 新 的 世界 政治 ， 世界 经济 ， 科学 技术 ， 文化教育 ， 武器 装备 ， 宗教 社会 信仰 ， 社会 管理 模式 ， 社会 结构 ， 贸易 交流 ， 宇宙 开发（月球 、 火星 等） ， 人类 社会 联系 紧密 ， 资本 在 全球 流动 ， 业 业 ， 产业 链 ， 全球 市场 ， 利润 ， 投资 等等 ， 全球化 ， 市场 化 等 ， 各国 竞争 更加 激烈 ， 甚至 呈现 新 冷战 新热 战 的 特点 ， 东西 方 紧密 交融 ， 经济 完全 切割 和 脱钩 难以 实现。 资本 是 逐利 的。 自由 市场 经济 ， 半 自由 市场 经济 ， 封闭式 经济 （计划 经济） ， 开放 式 社会 结构 ， 半 开放 开放 式 式 结构 结构 ， 半 开放 开放， 封闭式 社会 结构 等 需要 清醒 的 认知 和 研判。

The ghost of the deep sea --- a nuclear submarine cruising in the four oceans（Fangruida）

Nuclear submarine attacks, strategic bombers, land-based nuclear missiles and space warfare

--------Modern war and future war (new cold war and hot war)The ocean is the heart of the earth, and the ocean is the cradle of life on the earth.

Fangruida 2014v 2.2 English version 2017v1.3 electronic revision

這是方瑞達重要著作，原創於2014年，現作者再次修改修正，部分重寫或改寫，出版發行，以滿足世界各地網友和讀者的閱讀。本書編譯會有遺漏和錯誤，再版時再作修訂。

Translation school editor Lasco. H

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主要 参考 网站 参考书目 参考资料 等 （有关 图表 照片 等 转引 自 相关 网站 ， wiki ，百科全书 等)

维基 百科

大不列颠 百科全书

《简 氏 防务 周刊》 （Janes Defence Weekly）

斯德哥尔摩 国际 和平 研究所 （Institut international de recherche sur la paix de Stockholm ；

伦敦 国际 战略 研究所 （L'Institut international d'études stratégiques ； IISS）

国空军 国空军 United States Air Force ； 简称 ： USAF

红 宝 石 设 计 局 （ 全 称 ： 红 宝 石 海 洋 机 械 中 央 设 计 局 ，конструкторское бюро Рубин）

今日 中国 防务 （SinoDefense）

（Encyclopédie de l'histoire militaire）

亨廷顿 英 格尔斯 工业 公司 （Huntington Ingalls Industries）

军事 年鉴

《孙子兵 法》

《绝对 武器》 主要 阐述 了 相互 威慑 理论 的 原则

《战争 艺术 概论》

《海 权 对 历史 的 影响》

《大 纵深 战役 理论》

军事 武器 百科

现代 军事 年鉴 一